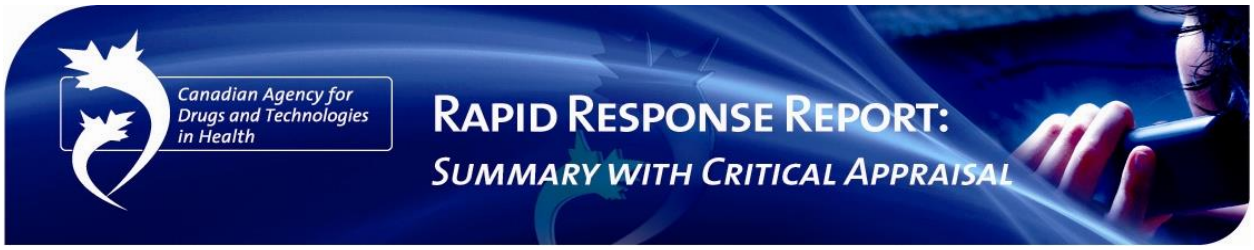

TITLE: Dental Scaling and Root Planing for Periodontal Health: A Review of the Clinical Effectiveness, Cost-effectiveness, and Guidelines

DATE: 17 October 2016

CONTEXT AND POLICY ISSUES

Periodontitis is an infection and inflammation of the soft tissues and bone surrounding the teeth, caused by an accumulation of bacterial plaque and the ensuing inflammatory response.[1] According to the Canadian Dental Association, periodontal disease is common, affecting up to 70% of Canadians at some point in their lifetimes.[2] If left untreated, periodontitis can progress to connective tissue destruction and alveolar bone loss, causing teeth to fall out.[3] Therefore, prevention of periodontitis is very important, and preventative measures provided by oral health care professionals include offering oral hygiene instructions (encouraging patients to brush teeth and floss regularly), and performing routine dental cleaning.[1] Dental cleaning includes scaling, which is the mechanical removal of plaque and calculus from the teeth around the gum line. For patients who develop periodontitis, a more extensive procedure called scaling and root planing (SRP) is performed. This involves mechanical debridement of plaque and calculus down to the root of the affected teeth, and is considered the "gold standard" initial treatment for periodontitis.[1,4] However, the optimal frequency of regular preventative scaling or therapeutic SRP, and the usual length of time (or number of units; one unit is defined as 15 minutes of service) to perform each procedure, is unclear. The purpose of this report is to review the evidence regarding the clinical and cost-effectiveness of scaling with or without root planing, as well as evidence-based guidelines for their use.

RESEARCH QUESTIONS

1. What is the clinical effectiveness of scaling with or without root planing for periodontal health?

2. What is the clinical effectiveness of different frequencies or number of units of scaling with or without root planing?

3. What is the cost-effectiveness of scaling with or without root planing for periodontal health?

4. What are the evidence-based guidelines regarding scaling with or without root planing?

KEY FINDINGS

Evidence from two systematic reviews, 12 randomized-controlled trials, and one non-randomized controlled clinical trial showed that scaling with or without root planing, provided with or without oral hygiene instructions, were associated with improvements in periodontal outcomes across a variety of adult patient populations within three months of treatment. Exceptions to this trend were noted in patients with less severe periodontal disease at baseline and in one study of pregnant women. Three evidence-based guidelines were identified that recommend SRP for the treatment of chronic periodontitis, including specific subtypes of periodontitis. One evidence-based guideline regarding the prevention of periodontitis was identified that recommends professional mechanical plaque removal to support self-performed oral health care. Limited evidence was identified regarding the clinical effectiveness of varying frequencies or units of scaling (not including root planing) that showed no significant differences between any evaluated frequencies. Long-term studies were not identified, which makes it difficult to conclude how long the positive effects of SRP may be maintained. One evidence-based guideline was identified that recommends supportive periodontal therapy every three to six months for patients with chronic periodontitis. No evidence was identified to address the cost-effectiveness question.

METHODS

Literature Search Methods

A limited literature search was conducted on key resources including Medline, PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, controlled clinical trials, economic studies, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2011 and September 14, 2016.

Rapid Response reports are organized so that the evidence for each research question is presented separately.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1 : Selection Criteria	
Population	Children, adolescents, or adults receiving dental care
Intervention	Scaling with or without root planing
Comparator	No treatment; different frequencies or number of units of scaling with or without root planing
Outcomes	Clinical effectiveness (e.g., periodontal health, reduction of bone or attachment loss), cost-effectiveness, guidelines (including indications, frequency of scaling with or without root planing, recommended number of units)
Study Designs	Health technology assessments, systematic reviews and meta-analyses, randomized controlled trials, controlled clinical trials, economic evaluations, evidence-based guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2011. Guidelines with unclear methodology were also excluded.

Critical Appraisal of Individual Studies

The included systematic reviews were critically appraised using the AMSTAR tool,[5] controlled clinical trials were critically appraised using the Downs and Black checklist,[6] and guidelines were assessed with the AGREE II instrument.[7] Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

A total of 670 citations were identified in the literature search. Following screening of titles and abstracts, 615 citations were excluded and 55 potentially relevant reports from the electronic search were retrieved for full-text review. Four potentially relevant publications were retrieved from the grey literature search. Of these 59 potentially relevant articles, 40 publications were excluded for various reasons, while 19 publications met the inclusion criteria and were included in this report. APPENDIX 1 describes the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in APPENDIX 5. One systematic review (SR) from 2013 was excluded as all three of its selected studies were also evaluated in a more recent SR that was identified for this report; the citation for the excluded SR is provided in the appendix.

Summary of Study Characteristics

Detailed study characteristics are provided in APPENDIX 2; characteristics of included SRs are presented in Table A1, study and patient characteristics of randomized controlled trials (RCTs) and non-randomized controlled trials are summarized in Table A2, and evidence-based guideline characteristics are described in Table A3.

Study Design

Two SRs[8,9] were identified for the research question on the clinical effectiveness of scaling and root planing (SRP) for periodontal health. Details regarding the methodology of the SR by Smiley et al.[9] were provided separately from the journal publication in the unabridged report.[10] Both SRs searched multiple electronic databases from 2004 to April 2014[8] or 1960 to July 2014[9] for RCTs and supplemented this search by reviewing the bibliographies of identified reviews. The SR by Needleman et al.[8] was an update of a previous review from 2005;[11] unlike the initial review, the 2014 update did not evaluate study designs other than RCTs. Ten RCTs were included in one SR, eight of which included relevant comparisons for this review[8] and a total of 72 RCTs were included in the other SR;[9] however, 11 RCTs were identified that included comparisons that are relevant to this report.

Twelve parallel group RCTs[12-23] regarding the clinical effectiveness of SRP for periodontal health that were not included in the SRs were identified for this report. In addition, one non-randomized, controlled clinical trial met the inclusion criteria.[24] In this trial, patients chose the study group to which they would like to be allocated.

Four evidence-based guidelines[25-28] regarding SRP were identified. Two guidelines were based on the SRs included in this report; the guideline by Smiley et al.[25] was based on the SR by Smiley et al.[9] and the guideline by Tonetti et al.[26] accompanied the SR by Needleman et al.[8] The guideline group from the Ministry of Health Malaysia[27] searched multiple electronic databases from January 2004 to January 2011[27] and reviewed the reference lists of selected articles. The HealthPartners Dental Group and Clinics[28] performed an electronic database search to identify supporting evidence for their guideline but details regarding the search strategy were not provided. The quality of the body of evidence was given a rating of high, moderate, or low in two guidelines,[25,26] and given one of five evidence levels based on study design in one guideline.[27] The recommendations in all four guidelines were developed based on expert opinion or through consensus-building after a review of the available supporting evidence, and the strength of the recommendations was formulated according to a combination of the certainty in the effect estimate and net benefit rating,[25] or by modifying existing recommendation rating schemes.[26,27] One guideline did not specify methods for determining the strength of either the recommendations or the supporting evidence.[28]

Country of Origin

One SR[8] was conducted by authors in the United Kingdom, and its corresponding guideline was produced by participants from several European countries in the European Workshop on Periodontology.[26] The other SR[9] was performed by a group from the United States, and its accompanying guideline[25] was developed by the Council on Scientific Affairs of the American Dental Association. The remaining two guidelines were produced by the Malaysian Ministry of Health, Oral Health Division[27] and the HealthPartners Dental Group and Clinics in the United States.[28]

The clinical trials were conducted in India[12,13,20] the United States,[15,23] Brazil,[16,24] Saudi Arabia,[14] Pakistan,[17] Turkey,[18] Australia,[19] Iran,[21] and Jordan.[22]

Patient Population

The SR by Needleman et al.[8] and the accompanying guideline from the European Workshop on Periodontology[26] focused on prevention of periodontitis in healthy adults, with or without gingivitis. The scope of this review and recommendations excluded adults with specific conditions such as diabetes. The intended users of the guideline were oral health professionals, the public, and policy-makers.[26]

The SR by Smiley et al.[9] and its corresponding guideline from the American Dental Association[25] included and were applicable to adults with chronic periodontitis, excluding aggressive periodontitis. Likewise, the 13 identified clinical trials[12-22,24,29] and the two remaining guidelines[27,28] evaluated adults with chronic periodontitis.

Some of the RCTs recruited adults with periodontitis and other specific health conditions, including rheumatoid arthritis,[12] type 2 diabetes mellitus (T2DM),[13,15,21] coronary heart disease,[17] hyperlipidemia,[14] cardiovascular disease,[20] and erectile dysfunction.[18] The objective of these studies was to determine the effect of SRP on condition-specific outcomes as well as periodontal outcomes. The non-randomized controlled clinical trial[24] exclusively recruited pregnant women with periodontitis to evaluate the birth and periodontal outcomes associated with non-surgical periodontal treatment.

Interventions and Comparators

The SR by Needleman et al.[8] evaluated the clinical effectiveness of professional mechanical plaque removal (PMPR) for the prevention of periodontitis, which was defined as supragingival and subgingival scaling but excluding root planing, performed with or without oral hygiene instruction (OHI). PMPR was compared with no treatment, different modes or timing of supragingival plaque removal, or OHI alone. The related guideline by Tonetti et al.[26] from the European Workshop on Periodontology produced recommendations regarding several approaches to the prevention of periodontitis, including PMPR.

All other publications identified for this report evaluated non-surgical interventions for the treatment of chronic periodontitis. The 11 relevant RCTs included in the SR by Smiley et al.[9] compared SRP alone with no treatment; the remaining 61 RCTs in the SR that are not addressed in this report evaluated combined interventions (SRP and antimicrobials or laser treatment).The guidelines by the Ministry of Health Malaysia[27] and the HealthPartners Dental Group[28] considered several interventions for diagnosis and treatment of periodontitis; only the recommendations related to SRP are reviewed in this report. The treatment comparisons in the clinical trials included SRP versus no treatment,[13,17,18,20] SRP with OHI versus OHI alone,[14,15,19,21-23] SRP with OHI versus no treatment,[12] or a combination of SRP, OHI, and "professional prophylaxis" (not otherwise described) versus OHI and "professional prophylaxis."[24]

The RCTs included in the two SRs inconsistently reported the number of sessions of SRP; when reported, SRP was conducted over either one or two sessions, or once per quadrant.[8,9] Eight clinical trials specified that SRP was conducted at the start of the trial, completed either in a single session[16,18,19] or over two to four sessions.[13,15,17,20,22] Two of these studies indicated that additional supportive periodontal therapy was provided to the SRP treatment group at follow-up visits.[13,22] One study provided SRP within 30 days of baseline and again at 16 weeks; periodontal outcomes were measured at 16 weeks (before the second round of SRP) and at 28

weeks.[23] Four studies did not provide details about the number of SRP sessions provided.[12,14,21,24]
The length of time spent to perform SRP (per session or overall) was not frequently reported in these studies. Two of the eight relevant RCTs in one SR reported that SRP sessions lasted 30 minutes, or 15 to 20 minutes ("plus additional time permitted at the visit", not otherwise described).[8] In the other SR, one of the 11 relevant included RCTs reported a 45 minute time limit for SRP.[9] Of the individual clinical trials included in this report, two RCTs discussed time limits for SRP; one specified that full-mouth SRP was completed in one session, lasting from 45 minutes to three hours,[19] and the other stated that there was no time limit to complete full-mouth SRP, and did not describe what the average session length was.[21]

One RCT evaluated different intervals of periodontal therapy.[16] All patients initially received one SRP session lasting up to 45 minutes and OHI, and then were randomized to receive supportive supragingival scaling and polishing at one month or three month intervals over the six month duration of the study.

Outcomes

Several periodontal outcomes were assessed in the SRs and clinical trials, including:

- Periodontal status as measured by the Simplified Oral Hygiene Index (OHI-S),[12,20] where a higher score indicates a poorer periodontal status
- Probing depth (PD);[8,12-24] measured from the gingival margin to the base of the sulcus
- Clinical attachment level (CAL);[8,9,12-19,21,23,24] defined as the distance between the cemento-enamel junction and the base of the gingival sulcus
- Plaque Index (PI) or number of teeth with plaque;[8,13,14,16,18,19,21,22,24] measured using the Silness and Loe method in four studies[13,14,19,22] and the O'Leary method in two studies[18,21]
- Gingival Index (GI), measured using the Loe and Silness method[12-14,19,21,22]
- Bleeding on probing (BOP);[12,13,15-18,23,24] specified in four studies as the proportion of sites that bled within 10 seconds,[12] 15 seconds[24] or 30 seconds of probing[13,17]
- Gingival recession[15,16]
- Periodontal epithelia surface area (PESA)[13]
- Periodontal inflammatory surface area (PISA)[13]

Though addressed by some studies that included study populations with specific clinical conditions, non-periodontal clinical outcomes are not reported in this review.

Twelve studies specified that outcomes were measured at four[13,19-22,24] and/or six sites per tooth.[12-18,22] Nine studies specified that outcomes were measured on six teeth[14,19] or all teeth except third molars.[13,16-19,22,24] One RCT[23] and the two SRs[8,9] did not specify where measurements were taken.

The SRs included studies that had follow-up periods ranging from less than one month to 48 months,[8] or least 6 months in length.[9] For the 13 primary studies, outcomes were measured at baseline and one month,[15,17,18] two months,[17,20] three months,[12-14,16,18,19,21,22] and/or 6 months.[13,16] One RCT provided SRP at baseline and 16 weeks and measured outcomes at 16 weeks (prior to the second round of SRP) and at 28 weeks.[23]The non-randomized controlled clinical trial that provided SRP to pregnant women evaluated periodontal outcomes at the second study visit,

which was performed post-partum but specific intervals between treatment and follow-up were not provided.[24]

The major outcomes considered by the guidelines included CAL and adverse effects of treatment,[25] prevention of periodontitis,[26,27] diagnosis of periodontitis,[27,28] and effectiveness of treatment for periodontitis.[27,28]

Summary of Critical Appraisal

A detailed list of study strengths and limitations are provided in APPENDIX 3.

Systematic Reviews

The two SRs[8,9] had several methodological strengths related to the comprehensive literature search of multiple databases and duplicate study selection and data extraction. Both reviews stated that the electronic database search was supplemented by reviewing bibliographies of key articles; however, one SR did not search for grey literature.[8] Both SRs clearly reported the risks of bias for each included study, and used these assessments of evidence quality to inform the conclusions. Each review used appropriate methods to synthesize the evidence; Needleman et al.[8] chose a narrative summary format due to the observed heterogeneity of the included studies, while Smiley et al.[9] performed a random-effects meta-analysis and statistical tests to address heterogeneity. The SR by Smiley et al.[9] also clearly reported a full list of included studies and their characteristics and excluded studies with reasons for exclusion. The possibility of publication bias was assessed in this SR both graphically and using statistical tests.[9] Publication bias was not assessed in the SR by Needleman et al.,[8] though the authors acknowledged that it may have been possible due to the focus on electronic database searches and exclusion of grey literature. Most other limitations of the SRs were related to unclear or insufficient reporting. For example, neither SR referred to a registered protocol or methods published prior to the start of the review or described conflicts of interest for the primary studies,[8,9] and one SR did not provide an excluded studies list or study characteristics for some of the included RCTs.[8]

The strengths and limitations noted for each SR are provided in Table A4.

Clinical Trials

Reporting

The main strengths of the identified RCTs and non-randomized controlled clinical trial were noted to be due to clear reporting. All 13 trials described the study objectives, provided clear patient inclusion and exclusion criteria, and all but one[12] summarized baseline characteristics and distribution of potential confounders between study groups. Eleven studies listed the main outcomes in the Methods section, with descriptions or references to how the outcomes would be measured;[12-15,17-23] however, two studies did not describe the methods for measuring the outcomes.[16,24] Most studies provided some detail about how SRP was performed, including the tools used during the procedure and number of sessions to complete treatment. However, one study stated that SRP was completed within 30 days of the baseline visit but did not provide further detail,[23] and three studies did not describe any methods for SRP.[12,14,24] The study by Sant'Ana et al.[24] also did not describe the "professional prophylactic" intervention provided to both treatment and control groups, so it is unclear how this may have contributed to response to therapy. The results were generally reported well; all studies summarized the results for the

main outcomes by presenting mean values for each group. Estimates of the random variability in the data (standard deviation or standard error) were presented in all but one of the studies[23] and actual probability values were provided in all but four studies.[13,16,18,24] Likewise, patient loss to follow-up and the number in each study group when it occurred were reported in the majority of studies.[12-17,19-22,24] Some aspects were infrequently reported in the included clinical trials; none provided the simple outcome data that contributed to those mean values, and adverse events potentially associated with the study interventions were not addressed by 10 studies.[12-15,17,18,20,22-24]

External Validity

The external validity of the studies was influenced by the choice of patients to include in the studies, the methods for patient selection, and the environments in which the studies were conducted. Six studies described the source population or methods for selecting patients.[13,14,17-19,24] However, seven studies did not clearly describe methods regarding patient recruitment or selection,[12,15,16,20-23] and six studies did not provide reasons for refusal in patients who declined to participate in the study.[13,16-18,21,24] The study by Sant'Ana et al.[24] identified eligible pregnant women with periodontitis from an antenatal care program, and the study by Kapellas et al.[19] included a convenience sample of Indigenous Australians; however, it is possible that individuals who are already participating in a health care program, or who are easily accessible to or cooperative with health care providers, would exhibit different health-related behaviours than people who do not do these things. In general, people who agree to participate in clinical trials may be more likely to be health conscious, for example brushing and flossing regularly, so this consideration applies to most studies, particularly those that did not specify how patients were recruited or selected. One study that recruited patients with rheumatoid arthritis was conducted in an orthopedics department,[12] and another that included patients with hyperlipidemia was conducted in a cardiac and renal transplant centre;[14] it is unclear whether the majority of patients with these specific health conditions would normally attend or receive the level of care provided at these types of facilities. All of these factors contribute to uncertainty around whether the patients who were approached or those who agreed to participate in these studies would be representative of the larger patient population.

Internal Validity

The internal validity of the studies was influenced by the study designs and methods for analyzing the results. Blinding patients to the intervention they were receiving was not done in any study, though this was likely impossible due to the nature of the interventions. Potential performance bias can still be minimized by blinding outcome assessors to the patient's study group; this practice was described in six studies[13,17,18,21,23,24] and not mentioned in seven.[12,14-16,19,20,22] A common strength for all studies was that they recruited all patients from the same source over the same period of time, and 12 of the 13 studies measured the outcomes at consistent time points that were the same for both the treatment and control groups.[12-21,23] One study referred to follow-up at the "2nd visit", the timing of which may have varied within and between groups.[24] Twelve of the included clinical trials were RCTs, but two did not describe methods for randomization.[16,20] Likewise, allocation concealment was not described in nine studies.[12-14,16,20-24] The study by Sant'Ana et al.[24] did not randomize patients to study groups; rather, allocation was based on patient choice. Despite a lack of randomization in this study, there were no significant differences between the treatment and control groups at baseline in any of the measured periodontal parameters and other baseline characteristics. Likewise, most of the RCTs demonstrated that baseline characteristics were well balanced between study groups. However, In the RCT by Khare et al.[12] the baseline OHI-S and BOP scores of the SRP group were significantly higher than those of the control group, indicating that the SRP group

started the study with a poorer periodontal status. In the study by Sexton et al.[23] the SRP group was significantly younger than the control group. In both cases, these intergroup differences could have impacted response to therapy. Regarding the data analyses, all studies used appropriate statistical tests to assess the main outcomes, none appeared to perform any unplanned, retrospective analyses, and six clearly reported either analyzing all patients (none lost to follow-up)[12,14,16,21,22] or analyzing an intention-to-treat population using the last observation carried forward.[13] Compliance with treatment was not a concern given that most studies performed SRP once at baseline; however, four studies only analyzed post-treatment data from patients who were available at a follow up visit,[15,19,20,24] and the population analyzed was unclear in three studies.[17,18,23] This may not accurately account for confounding variables (such as the age difference between groups in one RCT[23]) or reflect the true difference between treatment and control groups. Losing patients throughout the study can be especially impactful for studies with small sample sizes, but five studies reported an a priori power calculation to determine the necessary sample size required to detect a difference between groups in the non-periodontal primary outcomes.[13,15,17-19] Four of these studies maintained the necessary sample size was after attrition[13,15,17,19] while one study reported the power of the study at randomization but did not discuss accounting for attrition in this calculation, and the number of patients lost to follow-up was not reported.[18]

The strengths and limitations of individual clinical trials are provided in Table A5.

Evidence-based guidelines

Scope and Purpose
All four included evidence-based guidelines[25-28] had clearly described objectives, scope, and intended users and target populations.

Stakeholder Involvement
The American Dental Association guideline development group had broad representation from relevant groups, including research and methodology experts.[25] The guideline by Tonetti et al.[26] described member affiliations but not specific job titles. The group responsible for the Ministry of Health Malaysia's guideline[27] included representatives from clinical practice and the government; however, it was unclear whether a methodologist was included to provide guidance on best practices for evidence searches and synthesis. One guideline did not provide any details about those involved in development.[28] All publications described the target users of the guideline. None of the guidelines considered patient input; one group acknowledged that this process was ideal but not feasible for the development of their guideline, for unspecified reasons.[27]

Rigour of Development
Two guidelines[25,26] were based on separate SR publications[8,9] (see Table A4 for details of their strengths and limitations). The other two guidelines[27,28] used systematic methods to identify evidence from multiple databases and listed search terms and dates. The Ministry of Health Malaysia guideline also reviewed reference lists of key articles to search for publications not identified from the electronic database search;[27] however, neither guideline specified whether grey literature was included in the search.[27,28] These two guidelines also lacked clear descriptions of how evidence was selected, as inclusion and exclusion criteria were not provided.[27,28] In three guidelines, the body of evidence was evaluated, evidence statements were assigned a quality or certainty level, and these evidence statements were clearly linked to recommendations.[25-27] However, the guidelines referred to relying on expert consensus to

develop recommendations, but none described methods used during this process. One of the four guidelines explicitly considered evidence related to adverse events;[25] another guideline reported that adverse events were addressed in another guideline from the same European Workshop on Periodontology.[26] An external review process was described in three guidelines,[25,27,28] and a plan for updating the guideline was presented in two cases.[25,27]

Of note, the full text of the original HealthPartners Dental Group guideline could not be obtained for review, and a guideline summary[28] from the National Guidelines Clearinghouse (NGC) was used for this report. Several details regarding the methodology of guideline development were not provided in the summary. Guidelines summarized by NGC are considered evidence-based, and it is possible that more detailed methodology would be presented in another source that would change a critical appraisal of this guideline.

Clarity of Presentation
The recommendations from three of the guidelines were somewhat ambiguous, as they did not describe the elements that would influence treatment choices when considering SRP as initial treatment,[25] what combination of treatments should be provided given that SRP should not be the sole modality for patients with periodontitis,[26] or how to tailor periodontal treatment to patients' risk factors for disease progression.[27] However, these three guidelines addressed a range of periodontitis management options across the guidelines as a whole and clearly presented key recommendations in a visually identifiable way.[25-27] The majority of the content in the HealthPartners Dental Group guideline summary was presented in the Major Recommendations section, making it unclear which portions of the text reflected evidence summaries, expert opinion or commentary, or recommendations.[28]

Applicability
Applicability considerations were infrequently described; potential barriers and facilitators to implementation of the recommendations were not described in two guidelines,[25,28] one of the four guidelines specifically addressed cost considerations,[27] and none provided additional resources to assist guideline implementation. Two of the four guidelines presented or referred to auditing criteria.[27,28]

Editorial Independence
Each guideline addressed potential conflicts of interest of guideline development group members, but none provided an explicit statement that the recommendations were developed without undue influence from the funder.

The strengths and limitations of individual guidelines are provided in Table A6.

Summary of Findings

Two SRs,[8,9] 12 RCTs,[12-23] and one non-randomized controlled clinical trial[24] were identified regarding the clinical effectiveness of scaling with or without root planing for the prevention or treatment of periodontal disease in adults. In addition, four evidence-based guidelines regarding scaling and root planing were identified.[25-28] No relevant literature was identified to address the cost-effectiveness question.

Detailed study findings are provided in Table A7.

What is the clinical effectiveness of scaling with or without root planing for periodontal health?

Simplified Oral Hygiene Index (OHI-S)

Two RCTs evaluated OHI-S scores after treatment with SRP alone[20] or in combination with OHI[12] compared with no treatment. In the RCT by Khare et al.[12] the baseline OHI-S score of the SRP group was significantly higher than that of the control group, indicating that the SRP group started the study with a poorer periodontal status overall which may have impacted this group's response to therapy. Despite this baseline discrepancy, this study also showed that OHI-S scores were significantly lower in the SRP group than in the control group at three months.[12] The RCT by Koppolu et al.[20] reported a statistically significant reduction in OHI-S scores from baseline in the SRP group, while scores increased in the control group over the same period. This study did not report a statistical comparison between groups.[20] Neither study that evaluated this outcome commented on what constitutes a minimal clinically important difference in OHI-S score, yet Koppolu et al.[20] described plaque reduction in the treatment group as "satisfactory".

Probing Depth (PD)

PD was evaluated in 11 RCTs[12-15,17-23] and one non-randomized controlled trial.[24] General trends for the PD results from the clinical trials are presented in **Table 2**.

Eight RCTs found that PD improved after SRP treatment at follow-up time points ranging from four to 28 weeks after baseline.[13-15,18,20-23] This was signified by either a statistically significant reduction in mean PD in mm,[13-15,18,20,21] or a significant decrease in the proportion of sites with PD greater than 4 mm or 5 mm.[22,23] One study also showed a significant increase in the proportion of sites with PD ≤ 3 mm, demonstrating an overall decrease in PD severity as the PD distribution shifted to the less severe category at follow-up.[22] In some cases, PD improvement was only observed when PD was more severe (≥ 4 mm) at baseline.[15]

In these same eight RCTs, PD did not change[14,18,22] significantly increased,[13,20,21] or significantly decreased over time in the control group.[15,23] These latter two studies offered SRP and OHI to the treatment group and OHI alone to the control group, suggesting that OHI provides some benefit for patients with periodontal disease. However, SRP and OHI were significantly more effective at improving PD than OHI alone in these two studies.[15,23] Likewise, five of these studies statistically analyzed intergroup differences at follow-up and found that PD was significantly smaller in the SRP group than the control group,[13,15,18,21,23] and in one study this finding depended on the initial severity of periodontal disease.[15] Intergroup differences were not analyzed statistically in three of these eight RCTs.[14,20,22]

Two RCTs[12,19] did not statistically analyze changes from baseline in either study group but showed that the SRP group had significantly smaller PD[12] or significantly fewer sites with PD of at least 4 mm[19] than the control group at three months.

One RCT showed that there was no change from baseline in PD at two months in either the SRP or control group, and no difference between these groups at two months.[17] However, the mean PD in both groups at baseline was less than 4 mm, and the authors discussed an observed reduction in the prevalence of patients with PD greater than 4 mm, suggesting that perhaps the benefit of SRP was greater in a subset of patients with more severe periodontal disease. Finally, one non-randomized study showed that PD worsened in both the SRP and control groups; the authors attributed this to the fact that the study patients were pregnant women, suggesting that periodontal deterioration may be expected during pregnancy.[24]

However, there was a significant difference between the SRP and control groups at follow-up, leading the authors to conclude that SRP may mitigate periodontal disease progression during pregnancy.[24]

Table 2: Clinical Trial Results for Probing Depth

Result	Group	Follow-up time point						
		1 m	2 m	3 m	4 m	6 m	7 m	2nd visit[a]
Significant decrease from baseline	SRP	2 studies[15,18b]		6 studies[13,14,18,20-22]	1 study[23]	1 study[13]	1 study[23]	
	Control	1 study[15]			1 study[23]		1 study[23]	
Significant increase from baseline	SRP							1 study[24]
	Control			2 studies[20,21]		1 study[13]		1 study[24]
No change from baseline	SRP	1 study[15b]	1 study[17]					
	Control	1 study[18]	1 study[17]	3 studies[14,18,22]				
Significantly smaller PD in SRP group than control group		2 studies[15,18b]		5 studies[12,13,18,19,21b]	1 study[23]	1 study[13]	1 study[23]	1 study[24]
No significant difference between groups		1 study[15b]	1 study[17]	1 study[19b]				

m = month; PD = probing depth; SRP = scaling and root planing.
[a] Exact time interval from baseline to follow-up not specified.
[b] Differences from baseline or the difference between groups at follow-up were statistically significant for some sub-groups but not others in two studies.[15,19] See Table A7 for details.

Clinical Attachment Level (CAL)

CAL was evaluated in one SR,[9] nine RCTs,[12-15,17-19,21,23] and one non-randomized controlled clinical trial.[24] General trends for the CAL results from the clinical trials are presented in Table 3.

The SR by Smiley et al.[9] meta-analyzed the results from 11 RCTs and found that SRP was associated with a statistically significant improvement in CAL of 0.49 mm as compared with no treatment when measured at least six months after baseline. No details were provided in this review regarding the duration or frequency of SRP treatment.

Of the 10 individual clinical trials that evaluated this outcome, six found that the SRP group demonstrated significant improvements from baseline in CAL.[13-15,18,21,23] CAL improvement was reflected in statistically significant reductions in the mean CAL in mm[13-15,18,21] or the proportion of sites with a CAL greater than 2 mm.[23] One of these studies showed that a significant change from baseline in the SRP group was limited to patients with an initial PD of at least 4 mm.[15] This study also found that, in the SRP group, a greater proportion of measured sites had a less

severe CAL (1 to 2 mm) and fewer sites had more a severe CAL (at least 5 mm) compared with baseline; no such CAL severity shift was observed in the control group.[15]

In these six RCTs, CAL did not change,[14,15,18] significantly increased,[13,21] or significantly decreased from baseline in the control group.[23] This last result was from the same study that noted significant decreases in PD from baseline in the control group, who received OHI alone.[23] Four of the six RCTs found a significant difference in CAL between the SRP and control groups,[13,15,18,21] and in one study this finding was limited to the subgroup of patients with more severe periodontal disease at baseline.[15]

Of the remaining four clinical trials, two RCTs[12,19] did not statistically analyze changes from baseline but showed that the SRP group had significantly smaller CAL[12] or significantly fewer sites with CAL of at least 3 mm and PD of at least 4 mm[19] as compared with the control group at three months.

As with the findings for PD, one RCT showed that there was no change from baseline in CAL at two months in either the SRP or control group, and no difference between these groups at two months.[17] Likewise, the non-randomized controlled trial that recruited pregnant women with periodontitis showed that CAL did not change in the SRP group and worsened in the control groups, and this difference between groups was statistically significant.[24]

Table 3: Clinical Trial Results for Clinical Attachment Level

Result	Group	Follow-up time point						
		1 m	2 m	3 m	4 m	6 m	7 m	2nd visit[a]
Significant decrease from baseline	SRP	2 studies[15,18b]		4 studies[13,14,18,21]	1 study[23]	1 study[13]	1 study[23]	
	Control				1 study[23]		1 study[23]	
Significant increase from baseline	SRP	None						
	Control			2 studies[13,21]				1 study[24]
No change from baseline	SRP	1 study[15b]	1 study[17]					1 study[24]
	Control	2 studies[15,18]	1 study[17]	2 studies[14,18]				
Significantly smaller CAL in SRP group than control group		1 study[15b]		5 studies[12,13,18,19,21]		1 study[13]		1 study[24]
No significant difference between groups		1 study[15b]	1 study[17]		1 study[23]		1 study[23]	

CAL = clinical attachment level; m = month; SRP = scaling and root planing.
[a] Exact time interval from baseline to follow-up not specified.
[b] Differences from baseline or the difference between groups at follow-up were statistically significant for some sub-groups but not others in the study by Gay et al.[15] See Table A7 for details.

Plaque

One SR[8] and seven clinical trials[13,14,18,19,21,22,24] evaluated plaque-related outcomes (plaque index (PI),[13,14,22,24] number of teeth with plaque,[19] or proportion of sites with plaque[18,21]).

The SR[8] found that PMPR (scaling but not root planing) was associated with reduction in plaque levels, but that this improvement was not always significantly different from results for the control groups.

In five RCTs,[13,14,18,21,22] SRP was associated with a decrease in plaque from baseline at one month,[18] three months,[13,14,18,21,22] or six months.[13] There was a significant decrease[14] or no change[13,18,21,22] from baseline in the plaque levels of the control groups. Furthermore, in three of these five RCTs that analyzed intergroup differences, plaque levels were significantly lower in the SRP group than in the control group.[13,18,21]

The study of pregnant women with periodontitis found that professional prophylaxis and OHI, with or without SRP, did not affect PI scores at the second visit.[24] One RCT that found significant differences between SRP and control groups in other periodontal outcomes (PD, CAL, GI) did not observe the same results for the number of teeth with plaque at three months.[19]

Gingival Index (GI)

Six RCTs evaluated changes in GI after SRP treatment.[12-14,19,21,22] Four studies analyzed changes from baseline and found a significant improvement from baseline in the SRP group at three months[13,14,21,22] and six months.[13] In the control groups, GI worsened,[13,21] did not change,[22] or improved from baseline (when the control group received OHI).[14] All four studies that analyzed intergroup differences at follow-up found that GI scores were significantly different between the SRP and control groups at three months[12,13,19,21] and six months.[13]

Bleeding on Probing (BOP)

One SR[8] and seven clinical trials[12,13,15,17,18,23,24] evaluated the impact of periodontal treatment on gingival bleeding.

The SR[8] identified some evidence that showed a greater reduction in gingival bleeding or inflammation after PMPR as compared with no treatment, but this finding was not consistent across all studies and the authors suggested that the magnitude of effect did not appear to be as great as for plaque-related outcomes; however, no statistical comparisons were presented to support this conclusion.

Five RCTs with follow-up time points ranging from four weeks to 28 weeks found that the percentage of sites with BOP significantly decreased from baseline after SRP treatment.[13,15,17,18,23] There was no change[17,18] or an increase in BOP[13] from baseline for the control group in studies where no treatment was provided,[17,18] but there was also a significant decrease in BOP in control groups that received OHI alone.[15,23]

As with PD, BOP significantly increased from baseline in both study groups in the trial that recruited pregnant women with periodontitis.[24]

All seven clinical trials analyzed intergroup differences at follow-up; BOP was significantly lower in the SRP group than the control group in six studies[12,13,17,18,23,24] and there was no significant difference between groups in the RCT that found improvements in BOP in both groups.[15]

Gingival Recession

One RCT[15] evaluated gingival recession, which significantly decreased from baseline with SRP when the initial PD was at least 4 mm. There was no significant change at four weeks in the SRP group when initial PD was 1 to 3 mm, or in any patient from the control group. In addition, there was no significant difference between treatment groups overall at four weeks.[15]

Periodontal epithelia surface area (PESA) and Periodontal inflammatory surface area (PISA)

One RCT[13] evaluated PESA and PISA, which significantly decreased from baseline in the SRP group at the three month and six month follow-up visits.[13] The control group, which did not receive any treatment, demonstrated significantly higher PISA scores at 3 months and higher PISA and PESA values at six months. Scores for both outcomes were significantly lower in the SRP group than the control group at both time points.[13]

What is the clinical effectiveness of different frequencies or number of units of scaling with or without root planing?

One SR[8] and one RCT[16] were identified that evaluated the clinical effectiveness of different frequencies of dental scaling (not including root planing). No studies were identified that evaluated different frequencies of SRP.

The SR[8] included three RCTs that addressed different scaling frequency comparisons, ranging from once every three months to once every 24 months, and provided a narrative summary of the evidence by periodontal outcome. Two of the studies evaluated different fixed frequencies compared with each other (though the studies did not evaluate the same intervals) and one study compared scaling at fixed versus variable (as needed) intervals. Two of the three studies in the SR reported that there were no statistically significant differences in plaque levels, gingival bleeding, PD, or periodontal index between any of the scaling frequency groups. They also noted that plaque levels or gingival bleeding worsened in all groups, despite treatment. One study observed a trend toward improvement in attachment loss, plaque, and gingival bleeding or inflammation with increased scaling frequency; however, no statistical analysis of these comparisons was performed. This study also showed that, if combined with OHI, less frequent scaling was associated with greater plaque reduction than more frequent scaling alone. The overall conclusions provided in the SR were that, based on low quality evidence, there was some evidence to suggest that increased frequency of scaling was associated with improved plaque levels, gingival bleeding, and attachment loss, and that OHI is an important contributor to periodontal treatment outcomes.[8]

The RCT by Ueda et al.[16] compared the impact of supportive periodontal therapy (scaling and polishing) offered once every month versus once every three months after initial full-mouth debridement in patients with chronic periodontitis. At the six month follow-up appointment, both groups demonstrated significant improvements from baseline in PD, CAL, gingival recession, and the proportion of sites with plaque and BOP. However, the only statistically significant difference between the one month and three month groups was observed for the proportion of sites with plaque at the six month follow-up visit (19.2% versus 28.1%, respectively).[16]

What is the cost-effectiveness of scaling with or without root planing for periodontal health?

No relevant literature regarding the cost-effectiveness of scaling and root planing for periodontal health was identified; therefore, no summary can be provided.

What are the evidence-based guidelines regarding scaling with or without root planing?

Four evidence-based guidelines were identified that provide recommendations regarding scaling for the prevention of periodontitis in healthy adults[26] and regarding SRP for the treatment of chronic periodontitis.[25,27,28]
The guideline by Tonetti et al.[26] recommends that PMPR should be performed both supra-gingivally and sub-marginally until all plaque and calculus have been removed; however, scaling alone is insufficient for treating patients with periodontitis. Both statements were classified as good practice points; this classification was not explicitly defined in the guideline but likely reflects recommendations based on clinical expertise rather than evidence as this is the only type of recommendation in the guideline that was not presented along with a level of evidence.

Two guidelines recommend that SRP should be considered as a first-line therapy for patients with chronic periodontitis.[25,27] These recommendations were supported by evidence that was described as having either a moderate or high level of certainty,[25] or evidence rated as good or directly applicable to the target population.[27] Specific considerations affecting clinical decisions around using SRP were not described in the recommendation statements. One guideline suggests that SRP is the most effective treatment for necrotizing ulcerative periodontitis in particular, and that ultrasonic and hand tools can be combined to improve performance of SRP in locations where access is poor; however, this guideline did not provide ratings for the strength of any recommendation.[28]

One guideline was identified that discussed frequency of scaling. The guideline from the Ministry of Health Malaysia[27] recommends that supportive periodontal treatment should be provided every three to six months. Supportive periodontal treatment may include several potential therapy options, including supra- and sub-gingival removal of plaque and calculus, and treatment choices were recommended to be made according to the patient's specific characteristics. This recommendation was given Grade B based on the strength of the supporting evidence.[27]

Limitations

This review was limited by the lack of available evidence to address the cost-effectiveness question and to address the clinical effectiveness of scaling with or without root planing in children. Furthermore, few studies were identified comparing the clinical effectiveness of different frequencies of SRP, and the strength of evidence identified for this comparison in one SR was categorized as low due to the limited amount of data and unclear risk of bias in the evaluated studies.[8] In addition, two of 13 included studies[19,21] described the length of time spent on SRP procedures; this makes it difficult to draw conclusions about the optimal performance of SRP or preferred methods for clinical practice. Furthermore, one study spent up to three hours on SRP treatments,[19] and the other study did not impose a time limit,[21] and this may not be reflective of the level of care typically provided or eligible for coverage in clinical practice. All of the studies were conducted over a relatively short-term, with the majority measuring clinical outcomes at three months after SRP. While benefits were observed for most types of patients at this length of follow-up, it is unclear how long these benefits would be maintained. Therefore, the studies included in this report do not address what the maximum effective interval between sessions of scaling with or without root planing would be. All studies performed statistical tests

to inform a conclusion regarding statistical significance of outcomes; however, it is unclear how many of these findings would be considered clinically significant. Several studies recruited patients with periodontitis and other health conditions, such as diabetes[13,15,21] and cardiovascular or coronary heart disease;[17,20] it is possible these comorbidities could affect the patients' response to periodontal therapy, and therefore it is unclear whether the results obtained in these studies would be sufficiently generalizable to a more general population.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

In the studies identified for this review, SRP was generally associated with improvements in periodontal outcomes across a variety of adult patient populations, and statistically significant responses to one round of SRP treatment were usually observed within three months. Exceptions to this trend were noted in patients with less severe periodontal disease at baseline[15] and in one study of pregnant women.[24] OHI appeared to be another important intervention that contributed to overall periodontal health when offered alone or in combination with SRP.

Gay et al.[15] commented that observed changes in PD and CAL of 0.5 mm or less may have been statistically significant but not clinically significant. None of the other studies discussed the clinical significance of their findings, which is an important implementation consideration. Applying the clinical significance threshold of a greater than 0.5 mm change from baseline in PD and/or CAL to the other RCTs that evaluated these outcomes, six of the seven studies that reported a statistically significant result for the SRP group also appeared to meet this criterion for clinical importance.[12-14,16,18,20] None of these studies reported a change from baseline greater than 0.5 mm in PD or CAL in the untreated control group. One study reported statistically significant reductions in PD and CAL in the SRP group and statistically significant increases in the control group that were less than 0.5 mm in both groups.[21] In keeping with the positive trend of these findings, three evidence-based guidelines were identified that recommend SRP for the initial treatment of chronic periodontitis, including specific subtypes of periodontitis.[25,27,28]

Limited evidence was identified regarding the clinical effectiveness of varying frequencies of scaling (not including root planing) that rarely showed significant differences in periodontal outcomes between any evaluated frequencies. These findings are consistent with what was reported in the CADTH review from 2013 on the clinical effectiveness of scaling and polishing,[30] which identified one RCT that was also included in one of the SRs selected for this review.[8] Long-term studies were not identified, which makes it difficult to conclude how long the positive effects of SRP can be maintained and therefore what the ideal frequency of treatment would be. However, the clinical trial evidence showing periodontal improvements three months after SRP is consistent with the guideline from the Ministry of Health Malaysia that recommends supportive periodontal therapy every three to six months for patients with chronic periodontitis.[27]

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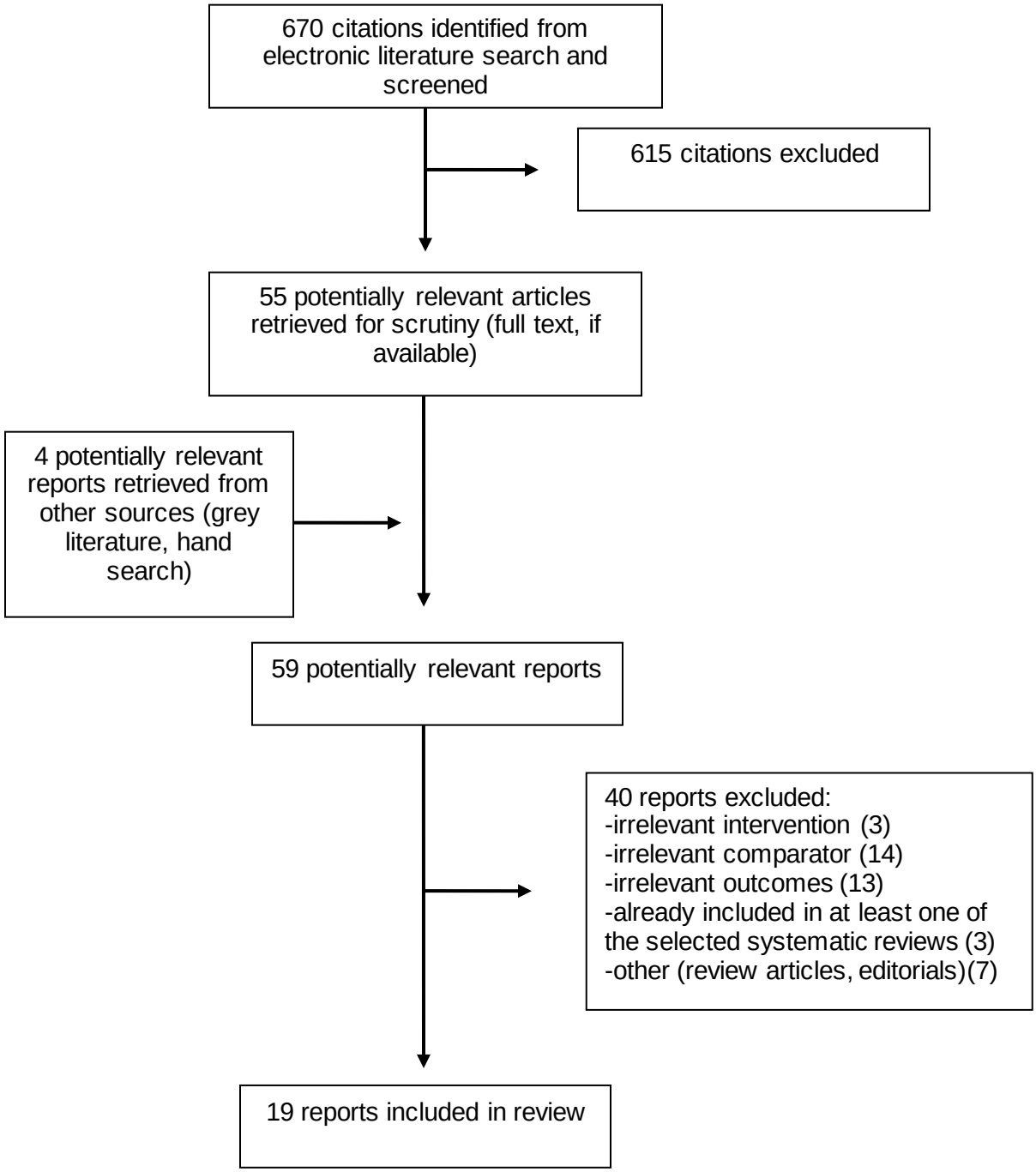
APPENDIX 1: Selection of Included Studies



APPENDIX 2: Characteristics of Included Publications

Table A1: Characteristics of Included Systematic Reviews

First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
Needleman, 2015, UK[8]	8 RCTs	Adults (≥ 18 years) with or without gingivitis; excluding specific health conditions (e.g., diabetes)	Professional mechanical plaque removal (supragingival and subgingival scaling, excluding root planing) with hand or powered instruments, with and without OHI[a]	No treatment, different modes or timing of supragingival plaque removal, OHI alone	Primary: tooth loss, CAL, gingival inflammation, oral HRQoL; Secondary: plaque level, PD, gingival recession, AEs, PROs Follow up: < 1 month to 48 months
Smiley, 2015, USA[9,10]	72 RCTs total; 11 RCTs addressing SRP alone versus no treatment, prophylaxis, or debridement	Adults with chronic periodontitis (excluding aggressive periodontitis)	SRP[b]	No treatment, supragingival scaling and polish (prophylaxis), debridement	CAL Follow-up: ≥ 6 months

AE = adverse event; CAL = clinical attachment level; OHI = oral hygiene instructions; HRQoL = health-related quality of life; PD = probing depth; PRO = patient-reported outcome; RCT = randomized controlled trials; SRP = scaling and root planing; UK = United Kingdom; USA = United States of America.

[a] Two of the eight included RCTs with comparisons relevant to this review described the number of units of SRP; one study reported SRP either one or two sessions of thirty minutes and the other reported one session of 15 to 20 minutes "plus additional time permitted at the visit."[8]

[b] One of 11 included RCTs with comparisons relevant to this review described the number of units of SRP; one RCT reported a 45 minute time limit.[10]

Table A2: Characteristics of Included Clinical Studies					
First Author, Publication Year, Country	**Study Design**	**Patient Characteristics**	**Intervention(s)[a]**	**Comparator(s)**	**Clinical Outcomes**
Khare, 2016, India[12]	RCT	Adults (18 to 65 years of age) with active rheumatoid arthritis and generalized chronic periodontitis;[b] n = 60	SRP and OHI; n = 30	No treatment; n = 30	Periodontal status (measured by OHI-S), PD, CAL GI, BOP (within 10 seconds), measured at 6 sites per tooth at baseline and 3 months
Kaur, 2015, India[13]	RCT	Adults (45 to 60 years of age) with T2DM and moderate (≥ 2 interproximal sites on different teeth with CAL ≥ 4 mm or PD ≥ 5 mm) or severe (≥ 2 interproximal sites on different teeth with CAL ≥ 6 mm and ≥ 1 interproximal site with PD ≥ 5 mm) generalized chronic periodontitis;[b] n = 100, stratified by good (HbA1c < 7%; n = 48) or poor (HbA1c > 7%; n = 48) glycemic control	SRP (4 sessions over 2 weeks, additional supportive SRP when necessary at follow-up visits); n = 50 (good glycemic control, n = 23; poor glycemic control, n = 27)	No treatment; n = 50 (good glycemic control, n = 25; poor glycemic control, n = 25)	PD and CAL,[c] PI and GI,[d] BOP (within 30 seconds), PESA, PISA at baseline, 3 months, 6 months
Tawfig, 2015, Saudi Arabia[14]	RCT	Adults (30 to 70 years of age) with hyperlipidemia (and receiving treatment with statins) and chronic periodontitis (PD ≥ 4 mm);[b] n = 30	SRP and OHI; n = 15	OHI alone; n = 15	PD, CAL, PI, GI, measured at 6 sites on 6 index teeth at baseline and 3 months
Gay, 2014, USA[15]	RCT	Non-smoking Hispanic adults (≥ 18 years of age) with T2DM (HbA1c ≥ 6.5%) and localized or generalized severe chronic periodontitis according to American Academy of Periodontology criteria;[b] n = 154	SRP (2 quadrants per appointment) and OHI; allocated, n = 77; analyzed, n = 66	OHI alone; allocated, n = 77; analyzed, n = 60	PD, CAL, BOP, gingival recession, measured at 6 sites per tooth at baseline and 4 to 6 weeks
Ueda, 2014, Brazil[16]	RCT	Adults (35 to 57 years of age) with moderate to severe generalized chronic periodontitis;[b] n = 28 All patients initially received full-mouth ultrasonic debridement lasting ≤ 45 minutes (using an ultrasonic scaler with subgingival	Supportive periodontal therapy (supragingival scaling and polishing) at 1 month intervals (5 sessions total); n =	Supportive periodontal therapy (supragingival scaling and polishing) at 3 month intervals (1 session total); n = 14	PD, CAL, supragingival PI, BOP, gingival recession, at baseline, 3 months, and 6 months[c]

Table A2: Characteristics of Included Clinical Studies					
First Author, Publication Year, Country	**Study Design**	**Patient Characteristics**	**Intervention(s)[a]**	**Comparator(s)**	**Clinical Outcomes**
		tips) and OHI	14		
Bokhari, 2012, Pakistan[17]	RCT (2:1)	Adults (> 30 years of age) with coronary heart disease (> 50% stenosis of at least one coronary artery documented by coronary angiography) and periodontitis (≥ 4 teeth with ≥ 1 site with PD ≥ 4 mm and CAL ≥ 3 mm; baseline BOP > 20% of sites);[b] n = 317	Full-mouth SRP (completed over 2 to 4 visits within 10 days of enrollment) and OHI; ITT, n = 212; completed, n = 166	No treatment; ITT, n = 105; completed, n = 87	PD, CAL, BOP (within 30 seconds) at baseline, 1 month (BOP only), and 2 months[c]
Eltas, 2013, Turkey[18]	RCT	Adult men (30 to 40 years of age) with severe or moderate erectile dysfunction and chronic periodontitis (> 30% of sites with PD and CAL ≥ 4 mm), without systemic disease that could affect periodontal health or erectile dysfunction, periodontal treatment in past 12 months, or systemic antibiotic therapy in past 6 months; n = 120	Full-mouth SRP (single session) and OHI; n = 60	No treatment; n = 60	PD, CAL, PI, BOP at baseline, 1 month, and 3 months[c]
Kapellas, 2013, Australia[19]	RCT	Indigenous Australian adults (≥ 18 years of age) with moderate periodontitis (≥ 2 interproximal sites with CAL ≥ 4 mm or PD ≥ 5 mm) without a history of cardiovascular conditions, antibiotic prophylaxis, current pregnancy, or visible oral or facial infections; n = 273 (total randomized)	Full-mouth SRP (single session, 45 minutes to 3 hours) and OHI; ITT: n = 138; PP: n = 124	OHI alone; ITT: n = 135; PP: n = 129	GI and presence of plaque and calculus measured at 6 index teeth, PD and CAL[d] at baseline and 3 months
Koppolu, 2013, India[20]	RCT	Adults (45 to 70 years of age) with cardiovascular disease (history of myocardial infarction) and periodontitis (PD ≥ 5 mm);[b] n = 40	SRP (1 session per week for 3 weeks); n = 20	No treatment; n = 20 (n = 19 analyzed; one person lost to follow-up)	Periodontal status (measured by OHI-S) and PD measured at 4 sites per tooth at baseline and 2 months
Moentaghavi, 2012, Iran[21]	RCT	Adults (mean age 50.29 ± 3 years) with T2DM (HbA1c > 7%) and mild to moderate periodontitis according to American Academy of Periodontology criteria;[b] n = 40 All patients initially received placement of	Full-mouth SRP and OHI (no time limit); n = 20	OHI alone; n = 20	PD, CAL, PI, GI measured at 4 sites per tooth at baseline and 3 months

Table A2: Characteristics of Included Clinical Studies					
First Author, Publication Year, Country	**Study Design**	**Patient Characteristics**	**Intervention(s)[a]**	**Comparator(s)**	**Clinical Outcomes**
		emergency restorations and extraction of unsalvageable teeth			
Kamil, 2011, Jordan[22]	RCT	Adults (41 to 53 years of age) with advanced periodontitis (≥ 6 teeth with PD > 5 mm and loss of attachment ≥ 3 mm in three sites of each involved tooth);[b] n = 36	SRP and OHI (completed over 2 or 3 visits within 10 days of enrollment) and rescaling of bleeding sites and reinforcement of OHI twice a month during follow-up; n = 18	OHI alone; n = 18	PD,[c] PI and GI,[d] measured at baseline and 3 months
Sant'Ana, 2011, Brazil[24]	NRS	Non-smoking pregnant women (16 to 39 years of age, gestational age 9 to 24 weeks) with periodontitis (severity not specified) and without a history of congenital heart disease, diabetes, hypertension, or genitourinary infections, or current use of corticosteroids or antibiotics; n = 33	SRP (received before 28 weeks of pregnancy), professional prophylaxis (not defined), and OHI; n = 16	Professional prophylaxis (not defined) and OHI; n = 17	PD,[d] CAL,[d] BOP (within 30 seconds),[d] PI (measured at 5 sites per tooth) at baseline and second exam (postpartum; dates not specified)
Sexton, 2011, USA[23]	RCT	Adults (≥ 18 years of age), smokers or non-smokers, with chronic periodontitis according to American Academy of Periodontology criteria who had not received periodontal therapy within the past two years;[b] n = 68	SRP (performed within 30 days of the baseline visit and at week 16) and OHI; n = 35	OHI alone; n = 33	PD, CAL, BOP at baseline, week 16, and week 28

BOP = bleeding on probing; CAL = clinical attachment level; GI = gingival index; HbA1c = hemoglobin A1c; ITT = intention-to-treat; NRS = non-randomized study; OHI = oral hygiene instructions; OHI-S = Simplified Oral Hygiene Index; PD = probing depth; PESA = periodontal epithelial surface area; PI = plaque index; PISA = periodontal inflammatory surface area; PP = per-protocol; RCT = randomized controlled trial; SRP = scaling and root planing; T2DM = type 2 diabetes mellitus; USA = United States of America.

[a] Including duration and frequency of SRP, if reported in the study.

[b] Common exclusion criteria included a history of acute or chronic systemic diseases, former and/or current smoking, pregnancy or lactation, medication use (either for chronic disease or antibiotic use within past three or six months), periodontal treatment within the past six months or one year.

[c] Measured at six sites per tooth, for every tooth except the third molars.

[d] Measured at four sites per tooth, for every tooth except the third molars.

Table A3: Characteristics of Included Guidelines					
		Smiley, 2015[25] – American Dental Association	**Tonetti, 2015[26] – Group 1 of the 11th European Workshop on Periodontology**	**Management of Chronic Periodontitis, 2012[27] – Ministry of Health Malaysia, Oral Health Division**	**Guidelines for the Diagnosis and Treatment of Periodontal Diseases, 2011[28] – HealthPartners Dental Group and Clinics**
Objectives	**Intended users/Target population**	Users: oral health professionals; Target population: patients with chronic periodontitis	Users: public, oral health professionals, policy makers; Target population: self-caring adults without disabilities or periodontal diseases	Users: oral health professionals; Target population: patients with chronic periodontitis	Users: dentists; Target population: patients with chronic periodontitis
	Intervention and Practice Considered	SRP alone, SRP with adjuncts (local and systemic antimicrobials, photodynamic therapy)	Professional mechanical plaque removal (SRP with or without concomitant OHI)	Surgical and non-surgical (including SRP) interventions for the prevention, screening, diagnosis, and treatment of periodontitis	Diagnosis, evaluation, treatment, and management of gingivitis and periodontitis, including SRP
	Major Outcomes Considered	CAL, adverse effects of treatment	Reduction of gingivitis, prevention of periodontitis	Effectiveness of prevention and treatment of periodontitis	Effectiveness of treatment, need for referral, patient compliance
Methodology	**Evidence Collection, Selection and Synthesis**	Systematic review by Smiley et al., 2015:[9] electronic database search and hand searching of published and unpublished literature; duplicate article selection, data extraction, and critical appraisal; random effects meta-analysis	Systematic review by Needleman et al., 2015:[8] electronic database search and hand searching of published literature; duplicate article selection, data extraction, and critical appraisal; narrative summary analysis	Electronic database and hand searching of published literature; duplicate article selection, data extraction, and critical appraisal; presentation of evidence summary tables	Electronic database searches
	Evidence Quality and Strength	Weighting according to a provided rating scheme (high, moderate, and low certainty of effect estimate)	Weighting according to a provided rating scheme based on risk of bias and consistency of results (high, moderate, and low	Weighted according to a provided rating scheme modified from the United States/ Canadian Preventive Services Task	Not described

Table A3: Characteristics of Included Guidelines					
		Smiley, 2015[25] – American Dental Association	Tonetti, 2015[26] – Group 1 of the 11th European Workshop on Periodontology	Management of Chronic Periodontitis, 2012[27] – Ministry of Health Malaysia, Oral Health Division	Guidelines for the Diagnosis and Treatment of Periodontal Diseases, 2011[28] – HealthPartners Dental Group and Clinics
			strength evidence)	Force	
	Recommendations Development and Evaluation	Recommendations based on expert consensus and strength of recommendations developed according to provided rating scheme (combination of level of certainty in the effect estimate and net benefit rating)	Recommendations based on expert opinion and strength of recommendations developed according to a modified GRADE approach	Recommendations based on reviews of the evidence and expert consensus in the absence of sufficient evidence; grading of recommendations was based on the modified version of the Scottish Intercollegiate Guidelines Network	Expert consensus
	Guideline Validation	External and internal peer review	Not described	External and internal peer review	External and internal peer review

CAL = clinical attachment level; GRADE = Grading of Recommendations Assessment, Development and Evaluation; OHI = oral hygiene instructions; SRP = scaling and root planing.

APPENDIX 3: Critical Appraisal of Included Publications

Table A4: Strengths and Limitations of Systematic Reviews and Meta-Analyses using AMSTAR[5]

Strengths	Limitations
Needleman, 2015[8]	
• Study selection and data extraction performed in duplicate, with a plan for resolving disagreements • Comprehensive literature search strategy used, searching multiple databases and reviewing bibliographies of review articles • Risk of bias assessment methods and results provided clearly for each study • Scientific quality of studies contributing to each outcome considered in formulation of evidence syntheses • Appropriate methods used to synthesize the data (descriptive summary justified by marked heterogeneity of included studies) • Conflict of interest and funding statement provided for the review (no external funding received)	• An a priori design was not provided; this was an update to a previously published SR but a protocol update registering modifications to the original SR objectives and protocol were not provided • Grey literature not described in search strategy • Excluded studies list not provided • Study characteristics not provided for three of ten included studies • Publication bias not formally assessed; authors stated that publication bias may have been possible due to the focus on electronic database searches and exclusion of grey literature • Conflicts of interest not addressed for each included study
Smiley, 2015[9,10]	
• Study selection performed in duplicate, data extraction performed in duplicate and data sets adjudicated by a third reviewer • Comprehensive literature search strategy used, searching multiple databases and reviewing bibliographies of review articles • Grey literature sought by asking clinical experts if they were aware of unpublished reports • Lists of included and excluded studies provided • Study characteristics of included studies provided • Risk of bias assessment methods and results provided clearly for each study • Scientific quality of studies contributing to each comparison considered in formulation of evidence syntheses and level of certainty in effect estimate • Appropriate meta-analytic methods used to combine study findings and statistical tests for heterogeneity were performed • Publication bias assessed (funnel plot provided and Egger's test performed) • Financial disclosures made for review authors	• An a priori design was not provided • Conflicts of interest not addressed for each included study

SR = systematic review.

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]

Strengths	Limitations
Khare, 2016[12]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Potential confounders listed and controlled for prior to randomization • Standard deviations and specific *P* values provided for each result • No patient loss to follow-up • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups	• Manner in which SRP was performed (e.g., number of sessions and time per session) not described • Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Unclear methods for patient recruitment and selection • Patients with rheumatoid arthritis and chronic periodontitis recruited for this study, which was conducted in a hospital orthopedics department; it is unclear whether this facility is reflective of the level of care most rheumatoid arthritis patients would normally receive • No mention of attempting to blind study patients or outcome assessors • No mention of allocation concealment • Distribution of potential confounders not provided for each study group; it is unclear whether adequate adjustments for confounding were made in the analyses • Power calculation not performed
Kaur, 2015[13]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Study patients (all diabetic) stratified by HbA1c levels prior to randomization, other potential confounders listed • Standard deviations provided for each result • Number of patients lost to follow-up provided for each group • Source population and method for selecting patients described • Study staff and facilities appeared to be representative of the treatment the majority of patients would receive • Two outcome assessors were blinded to the treatment allocation and results from the other periodontal assessment • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Specific *P* values not reported; findings reported as “not significant” or $P < 0.05$ • Number of patients who agreed and declined to participate provided, but reasons for refusal not provided • Blinding of study patients not mentioned and likely not possible • No mention of allocation concealment

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]	
Strengths	**Limitations**
• Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups • Adequate adjustment for confounders in the analysis (ITT population used, distribution of confounders between groups provided) • Power calculation performed	
Tawfig, 2015[14]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Potential confounders listed and controlled for prior to randomization • Standard deviations and specific *P* values provided for each result • No patient loss to follow-up • Source population and method for selecting patients described • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups • Adequate adjustment for confounders in the analysis (ITT population used, distribution of confounders between groups provided)	• Methods for treatment and control interventions not described • Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Patients with hyperlipidemia and chronic periodontitis recruited for this study, which was conducted in a cardiac and renal transplant centre; it is unclear whether this facility is reflective of the level of care most patients with hyperlipidemia would normally receive • No mention of attempting to blind study patients or outcome assessors • No mention of allocation concealment • Power calculation not performed
Gay, 2014[15]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients to be compared • Standard deviations and specific *P* values provided for each result	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Unclear how patients were selected for eligibility assessment • Unclear how many patients were invited to participate in the study • No mention of attempting to blind study patients or outcome assessors • Only patients who completed the intervention and attended follow-up visits were included in the analysis

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]	
Strengths	**Limitations**
• Number of patients lost to follow-up provided for each group • Study staff and facilities appeared to be representative of the treatment the majority of patients would receive • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups • Allocation sequences generated by a computer program and concealed from research coordinator and patients at the time of randomization • Power calculation was performed	
Ueda, 2014[16]	
• Study objective clearly described • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Distribution of principle confounding factors described for each group • Standard deviations provided for each result • No adverse events were reported for the duration of the study • No patient loss to follow-up • Study staff and facilities appeared to be representative of the treatment the majority of patients would receive • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups • Adequate adjustment for confounders in the analysis	• Main outcomes listed but the methods for measuring each not described • Simple outcome data (numerators and denominators) not provided • Specific *P* values not reported; significant findings reported as $P < 0.05$ • Unclear method of patient selection • Unclear reason for refusal in the two patients who did not participate • No mention of attempting to blind study patients or outcome assessors • Method of randomization not described, no mention of allocation concealment • No power calculation was performed

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]

Strengths	Limitations
Bokhari, 2012[17]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients to be compared • Standard errors and specific *P* values provided for each result • Number of patients lost to follow-up provided for each group • Source population and method for selecting patients described • Study staff and facilities appeared to be representative of the treatment the majority of patients would receive • Periodontal examiner and statistician blinded to each patient's treatment group • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups • Allocation concealment performed using sealed envelopes • Power calculation was performed	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Unclear reasons for refusal in the 37 patients who did not participate • Study patients not blinded • Unclear whether the ITT population was used for analysis of periodontal outcomes
Eltas, 2013[18]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients to be compared • Standard deviations provided for each result • Source population and method for selecting patients described; all patients attending the urology department were screened for eligibility	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Unclear whether any patients were lost to follow-up • Specific *P* values not reported; significant findings reported as $P < 0.05$ or $P < 0.001$ • Unclear reasons for refusal in the 48 patients who did not participate • Study patients not blinded • Unclear whether the ITT population was used for analysis of periodontal outcomes

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]	
Strengths	**Limitations**
• Study staff and facilities appeared to be representative of the treatment the majority of patients would receive • Outcome assessor was blinded • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups using a computer-generated list • Allocation performed by someone not involved in the study • Power calculation was performed	
Kapellas, 2013[19]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients • Standard deviations and specific *P* values provided for each result • Reported that no adverse events were observed for the duration of the study • Number of patients lost to follow-up provided for each group • Reasons for exclusion after study eligibility screening provided • Study staff and facilities were representative of the treatment the majority of patients would receive (if they attend treatment) • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Patients were randomized to study groups	• Simple outcome data (numerators and denominators) not provided • Convenience sample of Indigenous Australians assessed for periodontal status and potential study inclusion • No attempt to blind study patients or outcome assessors • Only complete-case and per-protocol analyses performed

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]

Strengths	Limitations
using a computer-generated permuted block randomization sequence • Allocation performed by clinicians unaware of block sizes • Power calculation was performed	
Koppolu, 2013[20]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients • Standard deviations and specific *P* values provided for each result • Number of patients lost to follow-up provided for each group • Study staff and facilities were representative of the treatment the majority of patients would receive • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time	• Simple outcome data (numerators and denominators) not provided • Adverse effects not addressed • Unclear method of patient selection, unclear total number of patients invited to participate • No attempt to blind study patients or outcome assessors described • Method of randomization not described • No mention of allocation concealment • Patient lost to follow-up excluded from the analysis • Sample size calculation reportedly done but not described
Moentaghavi, 2012[21]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients • Standard deviations and specific *P* values provided for each result • Adverse events addressed • No patient loss to follow-up • Study staff and facilities were representative of the treatment the majority of patients would receive	• Simple outcome data (numerators and denominators) not provided • Patients who chose to leave the study prior to completion were not described • Unclear method of patient selection • Unclear reasons for refusal in eight patients who declined to participate, unclear reasons for 16 patients who chose to leave the study • Blinding of study patients not done and likely not possible • Unclear level of compliance in each study group as the patients who did not complete the study were not described • No mention of allocation concealment • No power calculation done

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]	
Strengths	**Limitations**
• Outcome assessors blinded to patient's assigned group • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • Patients recruited from the same population, over the same period of time • Randomization performed using a computer-generated random numbers table	
Kamil, 2011[22]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Treatment and control interventions clearly described • Provided distributions of principal confounders in each group of patients • Standard deviations and specific *P* values provided for each result • No patient loss to follow-up • All patients who attended the study facility were screened for inclusion in the study • Study staff and facilities were representative of the treatment the majority of patients would receive • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both the treatment and control groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Randomization performed using a computer-generated random numbers table • Complete study population used for analysis	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Unclear how many patients were invited to participate and how many may have declined • No mention of blinding patients or outcome assessors • No mention of allocation concealment • No power calculation done a priori to determine sample size
Sant'Ana, 2011[24]	
• Study objective clearly described • Study inclusion and exclusion criteria clearly described • Provided distributions of principal confounders in each group of patients • Standard deviations provided for each result	• Main outcomes listed but methods for measurement and interpretation not consistently described clearly • Treatment and control interventions not described clearly ("professional prophylaxis" not defined)

Table A5: Strengths and Limitations of Controlled Trials using the Downs and Black checklist[6]

Strengths	Limitations
• All patients who attended the study facility were screened for inclusion in the study • Number of patients lost to follow-up reported for each study group • Study staff and facilities were representative of the treatment the majority of patients would receive • Outcome assessor was blinded to study group allocation • No apparent unplanned, retrospective analyses • Appropriate statistical tests used to assess the main outcomes • Patients recruited from the same population, over the same period of time	• Simple outcome data (numerators and denominators) not provided • Adverse events not addressed • Specific *P* values not provided; significant results reported as $P < 0.05$ • Pregnant women for potential inclusion were identified from an Antenatal Care Program; may not be representative of larger population of pregnant women • Unclear reasons for refusal in 65 patients who declined to participate in the study • Blinding of study patients not done and likely not possible • Differing lengths of time between intervention and follow-up not adjusted for in analysis • Large proportion of patients lost to follow-up (4/16 in treatment group, 10/17 in control group) • Patients lost to follow-up excluded from the analysis • Randomization not performed; allocation was based on patient choice • No mention of allocation concealment • No power calculation done
Sexton, 2011[23]	
• Study objective clearly described • Main outcomes provided in the Methods section, methods for measurement either described or referenced • Study inclusion and exclusion criteria clearly described • Provided distributions of principal confounders in each group of patients • Specific *P* values provided for results • All patients who attended the study facility were screened for inclusion in the study • Study staff and facilities were representative of the treatment most patients would receive • Outcome assessor was blinded • No apparent unplanned, retrospective analyses • Same length of time between intervention and follow-up in both study groups • Appropriate statistical tests used to assess the main outcomes • No evidence of non-compliance • Patients recruited from the same population, over the same period of time • Randomization performed using a computer-generated random numbers table	• Method for SRP (length of time, number of sessions) not described • Simple outcome data (numerators and denominators) not provided • Estimates of random variability in the data not provided • Adverse events not addressed • Unclear whether any patients were lost to follow-up, and if so whether they were included in the analysis • Unclear whether recruited patients were representative of the source population (patients recruited from the general dental clinic population and surrounding counties by advertisement; selection methods not otherwise described) • Unclear how many patients were invited to participate and how many may have declined • Blinding of study patients not done and likely not possible • No mention of allocation concealment • No power calculation done

ITT = intention-to-treat; SRP = scaling and root planing

Table A6: Strengths and Limitations of Guidelines using AGREE II'				
	Guideline			
Item	Smiley, 2015[25]	Tonetti, 2015[26]	Ministry of Health Malaysia, 2012[27]	HealthPartners Dental Group and Clinics, 2011[28]
1. The overall objective(s) of the guideline is (are) specifically described.	✓	✓	✓	✓
2. The health question(s) covered by the guideline is (are) specifically described.	✓	✓	✓	✓
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	✓	✓	✓	✓
4. The guideline development group includes individuals from all relevant professional groups.	✓	X	X	X
5. The views and preferences of the target population (patients, public, etc.) have been sought.	X	X	X	X
6. The target users of the guideline are clearly defined.	✓	✓	✓	✓
7. Systematic methods were used to search for evidence.	✓	✓	✓	✓
8. The criteria for selecting the evidence are clearly described.	✓	✓	X	X
9. The strengths and limitations of the body of evidence are clearly described.	✓	✓	✓	X
10. The methods for formulating the recommendations are clearly described.	X	X	X	X
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	✓	X	X	X
12. There is an explicit link between the recommendations and the supporting evidence.	✓	✓	✓	X
13. The guideline has been externally reviewed by experts prior to its publication.	✓	X	✓	✓
14. A procedure for updating the guideline is provided.	✓	X	✓	X
15. The recommendations are specific and unambiguous.	X	X	X	✓
16. The different options for management of the condition or health issue are clearly presented.	✓	✓	✓	✓
17. Key recommendations are easily identifiable.	✓	✓	✓	X
18. The guideline describes facilitators and barriers to its application.	X	✓	✓	X
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	X	X	X	X
20. The potential resource implications	X	X	✓	X

Table A6: Strengths and Limitations of Guidelines using AGREE II'				
	Guideline			
Item	Smiley, 2015[25]	Tonetti, 2015[26]	Ministry of Health Malaysia, 2012[27]	HealthPartners Dental Group and Clinics, 2011[28]
of applying the recommendations have been considered.				
21. The guideline presents monitoring and/or auditing criteria.	X	X	✓	✓
22. The views of the funding body have not influenced the content of the guideline.	X	X	X	X
23. Competing interests of guideline development group members have been recorded and addressed.	✓	✓	✓	X

✓ = yes; X = no or unclear.

APPENDIX 4: Main Study Findings and Author's Conclusions

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions
Systematic Reviews	
Needleman, 2015[8]	
PMPR versus no treatment (2 studies)[a] • Plaque: statistically significant reduction in plaque with PMPR, no change in the no treatment groups (2 studies) • Bleeding or inflammation: statistically significant reduction with PMPR in one of two studies; bleeding either did not change (1 study) or increased without treatment (1 study) PMPR + OHI versus no treatment (5 studies)[a] • Plaque: trend for greater improvement in PMPR + OHI group than no treatment group but difference between groups not always statistically significant (4 studies); little change in either study group (1 study) • Bleeding or inflammation: improvement in with treatment versus no treatment, potentially to a lesser degree than for plaque in treatment group (4 studies) PMPR + OHI versus OHI alone (3 studies)[a] • Plaque: statistically significant reduction with PMPR + OHI (2 studies); 2% difference between groups (statistically significant; 1 study); no difference between groups (1 study) • Bleeding or inflammation: both treatment groups had significant reductions from baseline and PMPR + OHI was significantly different from OHI alone (1 study); neither treatment group had a significant change from baseline (1 study); no significant difference was observed between groups (1 study) Different frequencies of PMPR (3 studies) • Plaque and bleeding or inflammation: reduction from baseline at 46 months in all groups that received scaling and polishing (once every 3 months [one 30 minute session], once every 6 months [alternating one or two 30 minute sessions], or once every 12 months [two 30 minute sessions], increased frequency of PMPR seemed to be associated with greater reduction of plaque and bleeding or inflammation at 46 months (statistically more effective if provided with OHI); (1 study) • Plaque and bleeding or inflammation: increased at 3 years with both fixed (once every 6 months) and variable (as needed) scaling and polishing; no statistically significant differences between groups (1 study) • Plaque and bleeding: no statistically significant difference after two years between scaling and polishing with OHI performed once every 6 months, 12 months, or 24 months; all groups demonstrated clinically important increase in gingival bleeding (1 study)	PMPR versus no treatment *"Evidence for greater reduction in plaque and bleeding/inflammation PMPR versus no treatment. There is no available evidence for an effect on PD or [CAL]. Strength of evidence: Low due to limited amount of data and risk of bias."* Page S24 PMPR + OHI versus no treatment *"PMPR + OHI achieves greater change in plaque and bleeding/inflammation compared with no treatment. There is no available evidence for an effect on PD or [CAL]. Strength of evidence: Moderate."* Page S23 PMPR + OHI versus OHI alone *"The most plausible synthesis is that there is no additional benefit to plaque and gingival bleeding outcomes of PMPR over that achieved by repeated thorough oral hygiene instructions based on oral health assessment. There is no available evidence for an effect on PD or AL. Strength of evidence: Moderate."* Page S23 Different frequencies of PMPR *"Some evidence for improved plaque and gingival bleeding outcomes with increasing frequency of PMPR. Effective oral hygiene instruction appears to be an important contributor to outcomes. Some evidence for reduced attachment loss with more frequent PMPR + OHI (3 monthly) compared with less frequent PMPR+OHI (12 monthly). Strength of evidence: Low."* Page S26

Table A7: Summary of Findings of Included Studies

<table>
<tr><th>Main Study Findings</th><th>Author's Conclusions</th></tr>
<tr><td>

- No statistically significant difference in PD or periodontal index with different frequencies of PMPR (1 study each)
- Trend for reduction in attachment loss with increased frequency of PMPR (no statistical analysis performed; 1 study)

</td><td></td></tr>
<tr><td colspan="2">Smiley, 2015[9]</td></tr>
<tr><td>

SRP versus no treatment (11 studies)[a]

- CAL gain: mean difference between groups = 0.49 mm (95% CI 0.36 mm to 0.62 mm)
- CAL gain (after removal of 2 outliers): mean difference between groups = 0.43 mm (95% CI 0.19 mm to 0.67 mm)
- Moderate level of certainty for CAL estimate of effect due to unclear risk of bias (no serious issues regarding consistency, applicability, precision, or publication bias)

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"On average, treatment of chronic periodontitis with SRP was associated with a 0.5 mm improvement in CAL against no treatment at a moderate level of certainty." Page 521

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<tr><td colspan="2">Randomized and Non-randomized Controlled Trials</td></tr>
<tr><td colspan="2">Khare, 2016[12]</td></tr>
<tr><td>

- Periodontal outcomes, mean value (SD)

Outcome		SRP + OHI (n = 30)	No treatment (n = 30)
OHI-S	Baseline	4.0313[a] (1.0717)	3.2287 (1.5073)
	3 months	1.1697 (0.4553)	3.357 (1.6215)
PD, mm	Baseline	5.2323 (0.4482)	5.296 (0.3843)
	3 months	4.2937 (0.436)	5.5283 (0.3189)
CAL, mm	Baseline	4.5357 (1.0513)	4.1027 (0.9338)
	3 months	3.79 (0.9602)	4.371 (0.8711)
GI	Baseline	2.403 (0.6492)	2.1847 (0.8862)
	3 months	0.6841 (0.5283)	2.3823 (0.7232)
BOP, % of sites	Baseline	97.3200[b] (6.5943)	79.8333 (27.596)
	3 months	31.1593 (15.7808)	90.3333 (17.3430)

[a] Significantly different than OHI-S in no treatment group, $P = 0.0208$
[b] Significantly different than BOP in no treatment group, $P = 0.0013$

- Significant difference between treatment and control groups at 3 months for all outcomes: OHI-S, GI, BOP, PD, $P = 0.0001$; CAL, $P = 0.0171$

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- In patients with rheumatoid arthritis and moderate to severe periodontitis, non-surgical periodontal treatment led to improvement in periodontal clinical parameters.

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<tr><td colspan="2">Kaur, 2015[13]</td></tr>
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- Periodontal outcomes, mean value (SD)

Outcome		SRP (n = 50)	No treatment (n = 50)
PD, mm	Baseline	2.96 (0.46)	3.08 (0.55)
	3 months	2.17 (0.43)	3.10 (0.56)
	6 months	2.15 (0.42)	3.13 (0.57)
CAL, mm	Baseline	3.46 (0.53)	3.37 (0.61)
	3 months	2.77 (0.62)	3.40 (0.62)
	6 months	2.75 (0.62)	3.44 (0.64)
PI	Baseline	1.64 (0.26)	1.63 (0.26)
	3 months	0.29 (0.12)	1.65 (0.31)

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"The present results show that non-surgical periodontal treatment is associated with significant improvement in glycemic and periodontal status in individuals with [type 2 diabetes mellitus] and moderate-to-severe periodontitis." Page 207

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</table>

Table A7: Summary of Findings of Included Studies

Main Study Findings				Author's Conclusions
	6 months	0.28 (0.09)	1.68 (0.34)	
GI	Baseline	1.57 (0.28)	1.63 (0.17)	
	3 months	0.66 (0.27)	1.70 (0.30)	
	6 months	0.64 (0.26)	1.75 (0.32)	
BOP, % of sites	Baseline	73.68 (14.63)	75.36 (10.49)	
	3 months	39.07 (11.68)	76.99 (11.26)	
	6 months	38.96 (11.62)	78.88 (11.84)	
PESA, mm^2	Baseline	1,513.73 (274.39)	1,523.97 (323.59)	
	3 months	1,082.03 (254.5)	1,544.59 (330.57)	
	6 months	1,067.94 (250.3)	1,558.88 (334.59)	
PISA, mm^2	Baseline	1,256.19 (339.98)	1,289.92 (303.33)	
	3 months	751.18 (270.94)	1,317.75 (307.84)	
	6 months	729.22 (265.99)	1,337.37 (312.13)	

- SRP: significant reduction from baseline in all periodontal outcomes at 3 and 6 months ($P < 0.05$)
- No treatment: significant increase from baseline in PISA at 3 months and PD, CAL, GI, BOP, PISA, PESA at 6 months
- Significant difference between treatment and control groups in all periodontal outcomes at 3 and 6 months ($P < 0.05$)

Tawfig, 2015[14]

- Periodontal outcomes, mean value (SD)

Outcome		SRP + OHI (n = 15)	OHI (n = 15)
PD, mm	Baseline	3.34 (0.40)	3.13 (0.62)
	3 months	2.53 (0.40)	3.13 (0.60)
CAL, mm	Baseline	4.27 (0.52)	4.11 (0.76)
	3 months	3.38 (0.57)	4.10 (0.74)
PI	Baseline	1.62 (0.45)	1.62 (0.50)
	3 months	1.06 (0.24)	1.17 (0.27)
GI	Baseline	1.77 (0.44)	1.74 (0.40)
	3 months	1.03 (0.22)	1.32 (0.30)

- SRP + OHI group: significant reduction from baseline in all periodontal outcomes at 3 months ($P < 0.001$)
- OHI alone: significant reduction from baseline in at 3 months in PI ($P = 0.005$) and GI ($P = 0.003$); no significant difference in PD or CAL
- Intergroup differences not analyzed statistically

"Local non-surgical periodontal therapy resulted in improved periodontal health…among hyperlipidemic patients having chronic periodontitis." Page 9 to 10 of 21.

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions

Gay, 2014[15]

- Periodontal outcomes, mean value (SD)

Outcome		SRP + OHI (n = 66)	OHI (n = 60)
PD, mm[a]	Baseline	2.6 (0.2)	2.6 (0.2)
	Week 4	2.5 (0.4)	2.8 (0.5)
PD, mm[b]	Baseline	4.8 (0.3)	4.7 (0.3)
	Week 4	3.6 (0.6)	4.2 (0.7)
PD, mm[c]	Baseline	7.4 (0.5)	7.4 (0.6)
	Week 4	5.3 (1.2)	5.8 (1.5)
CAL, mm[a]	Baseline	3.1 (1.0)	3.2 (1.0)
	Week 4	3.1 (1.1)	3.3 (1.1)
CAL, mm[b]	Baseline	5.1 (1.0)	5.1 (1.2)
	Week 4	4.6 (1.0)	4.9 (1.3)
CAL, mm[c]	Baseline	7.7 (1.4)	8.1 (1.7)
	Week 4	6.9 (1.4)	7.3 (1.6)
REC, mm[a]	Baseline	−0.5 (0.8)	−0.6 (0.9)
	Week 4	−0.6 (0.9)	−0.6 (1.0)
REC, mm[b]	Baseline	−0.3 (0.9)	−0.4 (1.1)
	Week 4	− 0.5 (0.9)	−0.5 (1.1)
REC, mm[c]	Baseline	−0.4 (1.4)	−0.7 (1.5)
	Week 4	−0.8 (1.3)	−0.8 (1.4)
BOP, % of sites	Baseline	51.2 (29.4)	51.8 (30.0)
	Week 4	28.2 (25.0)	39.6 (27.4)

[a] Sites with initial PD of 1 to 3 mm.
[b] Sites with initial PD of 4 to 6 mm.
[c] Sites with initial PD of ≥ 7 mm; treatment group, n = 48; control group, n = 42.

- SRP + OHI group: significant reduction from baseline in PD, CAL, and REC (initial PD ≥ 4 mm) and BOP at the 4th week ($P < 0.001$); no significant difference from baseline in PD, CAL, and REC when initial PD was 1 to 3 mm
- SRP + OHI group: significant increase in the percentage of sites with CAL 1 to 2 mm ($P < 0.001$); significant decrease in the percentage of sites with CAL ≥ 5 mm ($P < 0.001$); no significant change from baseline for these CAL outcomes in the control group
- OHI alone: significant reduction from baseline in PD and CAL (any initial PD) and BOP at the 4th week ($P < 0.001$); no significant difference from baseline in REC with any initial PD
- Both groups: Significant differences ($P < 0.001$) between treatment and control groups at the 4th week in PD (when initial PD was 1 to 6 mm and CAL (when initial PD was 1 to 3 mm); no significant difference between groups in BOP, CAL (when initial PD was ≥ 4 mm), REC, and PD (when initial PD was ≥ 7 mm)

- Treatment with SRP and OHI or OHI alone was associated with improvements in periodontal clinical outcomes; improvements were greater with SRP and OHI than with OHI alone for sites with slight to moderate attachment loss.
- The statistically significant improvements in CAL in the SRP + OHI group (not observed with OHI alone) reflect an overall shift from severe attachment loss to more slight to moderate attachment loss.
- Observed changes in periodontal measurements of 0.5 mm or less may have been statistically significant but are not clinically significant.
- Improved oral home care may have reduced subgingival bacteria (thereby reducing PD at deep sites) or reduced inflammation previously impeding accurate measurements.

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions

Ueda, 2014[16]

- Periodontal outcomes, mean value (SD)

Outcome		Scaling and Polishing – Monthly (n = 14)	Scaling and Polishing – Once every 3 months (n = 14)
PD, mm	Baseline	4.8 (0.5)	4.2 (0.6)
	3 months	3.6 (0.5)	3.2 (0.4)
	6 months	2.7 (0.6)	2.9 (0.4)
CAL, mm	Baseline	5.1 (0.5)	4.8 (0.9)
	3 months	4.5 (0.7)	4.1 (0.8)
	6 months	3.9 (0.9)	3.8 (0.7)
PI, % of sites[a]	Baseline	70.0 (13.9)	74.4 (18.0)
	3 months	33.4 (13.7)	49.1 (23.1)
	6 months	19.2 (11.4)	28.1 (19.5)
BOP, % of sites[a]	Baseline	52.3 (12.8)	43.3 (17.3)
	3 months	21.0 (12.8)	15.4 (8.4)
	6 months	9.3 (4.6)	8.1 (6.0)
REC, mm	Baseline	0.4 (0.3)	0.7 (0.5)
	3 months	1.0 (0.7)	0.8 (0.6)
	6 months	1.0 (0.7)	0.9 (0.6)

[a] Measured dichotomously.

- Significant improvement from baseline in all periodontal outcomes at 3 months and 6 months in both groups ($P < 0.05$)
- Significant difference between treatment groups in PI at 6 months ($P < 0.05$); no significant difference between treatment groups in any other outcome at any time point

"Supportive periodontal therapy at both one- and three-month intervals enabled short-term stability of clinical improvements obtained after full-mouth ultrasonic debridement in patients with chronic periodontitis. Although this study did not detect differences in BOP and [PD] between the groups at any of the time points evaluated, it is important to emphasize that this was a short-term investigation. Therefore, long-term studies are necessary to conclusively establish the impact of different maintenance recall intervals on the stability of the clinical results obtained after full-mouth ultrasonic debridement." Page 328.

Bokhari, 2012[17]

- Periodontal outcomes, mean value (SE)

Outcome		SRP + OHI (n = 212)	No treatment (n = 105)
PD, mm	Baseline	3.5 (0.1)	3.4 (0.1)
	1 month	Not measured	Not measured
	2 months	3.1 (0.0)	3.3. (0.1)
CAL, mm	Baseline	3.4 (0.1)	3.3. (0.1)
	1 month	Not measured	Not measured
	2 months	3.3 (0.1)	3.3. (0.1)
BOP, % of sites	Baseline	42.1 (1.0)	39.1 (1.5)
	1 month	27.5 (0.9)	36.1 (1.8)
	2 months	23.6 (0.9)	35.6 (1.6)

- SRP + OHI: Significant reduction from baseline in BOP at 1 month and 2 months, and in PD at 2 months ($P = 0.001$); no significant change in CAL
- No treatment: no significant change from baseline in BOP, PD, or CAL at either time point
- Significant differences between groups in BOP at 1 and 2 months ($P < 0.001$); no significant difference between groups in PD or CAL at 2 months

- Improvement in periodontal outcomes was observed at two months following non-surgical mechanical therapy.
- Periodontal achievements may be sustained in the long-term with appropriate oral home care and professional maintenance.

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions

Eltas, 2013[18]

- Periodontal outcomes, mean value (SD)

Outcome		SRP (n = 60)	No treatment (n = 60)
PD, mm	Baseline	3.62 (0.64)	3.88 (0.58)
	1 month	2.95 (0.55)	3.45 (0.5)
	3 months	2.77 (0.59)	3.79 (0.51)
CAL, mm	Baseline	4.14 (0.76)	4.20 (0.85)
	1 month	3.55 (0.67)	3.79 (0.72)
	3 months	3.45 (0.67)	4.20 (0.84)
PI, % of sites	Baseline	76 (13)	72 (11)
	1 month	15 (6)	64 (11)
	3 months	21 (6)	69 (11)
BOP, % of sites	Baseline	68 (15)	67 (16)
	1 month	25 (5)	61 (15)
	3 months	28 (5)	63 (15)

- SRP: Significant reduction from baseline for all periodontal outcomes at 1 month and 3 months (PD and CAL, $P < 0.05$, percentage of sites with plaque and BOP, $P < 0.001$)
- No treatment: no significant change from baseline in any periodontal outcome
- Significant differences between groups in all periodontal outcomes at 1 and 3 months (PD and CAL, $P < 0.05$; percentage of sites with plaque and BOP, $P < 0.001$)

- SRP treatment was associated with significant improvement in all measured periodontal parameters at one and three months.

Kapellas, 2013[19]

- Periodontal outcomes, mean value (SD)

Outcome		SRP + OHI (n = 138)	OHI (n = 135)
PD ≥ 4 mm, % of sites	Baseline	13.40 (12.84)	14.50 (14.87)
	3 months	9.07 (10.49)	12.90 (12.37)
PD ≥ 5 mm, % of sites	Baseline	4.41 (6.97)	5.40 (8.93)
	3 months	3.13 (6.88	4.21 (5.60)
CAL ≥ 3 mm and PD ≥ 4 mm, % of sites	Baseline	13.21 (12.68)	14.32 (14.70)
	3 months	8.89 (10.39)	12.51 (11.73)
Teeth with Plaque[a]	Baseline	5.26 (1.21)	5.37 (1.17)
	3 months	5.27 (1.33)	5.42 (1.04)
Teeth with Calculus[a]	Baseline	4.20 (1.62)	4.17 (1.66)
	3 months	2.20 (1.79)	4.01 (1.67)
GI	Baseline	1.44 (0.71)	1.57 (0.65)
	3 months	1.04 (0.61)	1.33 (0.61)

[a] Of 6 index teeth total; each of 6 index teeth per patient scored for the presence of plaque or calculus (yes = 1, no = 0)

- Significant difference between treatment and control groups at 3 months in the percentage of sites with PD ≥ 4 mm ($P = 0.009$), percentage of sites with CAL ≥ 3 mm and PD ≥ 4 mm ($P = 0.012$), mean number of teeth with calculus ($P < 0.001$), and GI ($P = 0.005$)

"In conclusion, this study shows that intensive non-surgical periodontal therapy can improve periodontal status in a high-risk population without changing oral hygiene. These findings provide supportive evidence for the provision of periodontal services as part of regular dental care to Indigenous Australians." Page 1022

Table A7: Summary of Findings of Included Studies

<table>
<tr><th>Main Study Findings</th><th>Author's Conclusions</th></tr>
<tr><td>

- No significant difference between treatment and control groups at 3 months in the percentage of sites with PD ≥ 5 mm or the mean number of teeth with plaque

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<tr><td>Koppolu, 2013[20]</td><td></td></tr>
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- Periodontal outcomes, mean value (SD)

Outcome		SRP (n = 20)	No treatment (n = 19)
OHI-S	Baseline	4.74 (0.7)	4.45 (0.65)
	3 months	1.5 (0.4)	4.85 (0.62)
PD, mm	Baseline	5.10 (0.4)	5.10 (0.3)
	3 months	3.84 (0.26)	5.4 (0.4)

- SRP: Significant reduction from baseline in both periodontal outcomes at 3 months (P = 0.001)
- No treatment: significant increase from baseline in both periodontal incomes at 3 months (P = 0.001)
- Intergroup differences not analyzed statistically

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- Thorough non-surgical periodontal treatment followed by regular maintenance led to satisfactory plaque control and improvement in PD.

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<tr><td>Moentaghavi, 2012[21]</td><td></td></tr>
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- Periodontal outcomes, mean value (SD)

Outcome		SRP + OHI (n = 20)	OHI (n = 20)
PD, mm	Baseline	2.31 (0.65)	2.06 (0.24)
	3 months	2.21 (0.6)	2.33 (0.3)
CAL, mm	Baseline	3.14 (1.08)	3.1 (1.05)
	3 months	2.8 (1.09)	3.47 (1.44)
PI, % of sites	Baseline	88.9 (17.38)	94.44 (6.62)
	3 months	63.22 (21.23)	87 (18.7)
GI	Baseline	1.867 (0.83)	1.15 (0.51)
	3 months	1.24 (1.03)	1.723 (0.48)

- SRP + OHI: Significant decrease from baseline in all periodontal outcome measures at 3 months (P ≤ 0.012)
- OHI: Significant increase from baseline in PD, CAL, and GI at 3 months (P ≤ 0.049); no significant change in the percentage of sites with plaque
- Significant difference between study groups in every periodontal outcome measure at 3 months (P ≤ 0.02)

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- Periodontal therapy significantly improved all periodontal parameters.
- Lack of periodontal therapy was associated with worsening status in all measured periodontal outcomes.

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<tr><td>Kamil, 2011[22]</td><td></td></tr>
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- Periodontal outcomes, mean value (SD)

Outcome		SRP + plaque control + OHI (n = 18)	OHI (n = 18)
PD 0–3 mm, % of sites	Baseline	60.8 (10.8)	59.0 (10.8)
	3 months	95.4 (3.6)	58.8 (10.8)
PD 4–6 mm, % of sites	Baseline	35.7 (11.2)	37.3 (11.7)
	3 months	4.5 (3.5)	37.4 (11.7)
PD ≥ 7 mm, % of sites	Baseline	3.5 (1.9)	3.7 (2.1)
	3 months	0.1 (0.3)	3.8 (2.2)
PI	Baseline	1.7 (0.1)	1.7 (0.1)

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- Non-surgical periodontal therapy was associated with significant improvement in clinical measures of periodontitis.

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</table>

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions

	3 months	0.2 (0.0)	1.7 (0.1)
GI	Baseline	1.8 (0.1)	1.7 (0.1)
	3 months	0.3 (0.2)	1.7 (0.1)

- SRP: Significant change from baseline in all periodontal outcome measures at 3 months ($P < 0.005$)
- OHI: No significant change from baseline in any periodontal outcome measure at 3 months
- Intergroup differences not analyzed statistically

Sant'Ana, 2011[24]

- Periodontal outcomes, mean value (SD)

Outcome		SRP + Prophylaxis + OHI (n = 16)	Prophylaxis + OHI (n = 17)
PD, mm	Baseline	2.10 (0.02)	2.15 (0.02)
	2nd visit	2.28 (0.02)	2.53 (0.03)
CAL, mm	Baseline	0.48 (0.02)	0.47 (0.01)
	2nd visit	0.56 (0.02)	0.75 (0.03)
PI[a]	Baseline	0.71 (0.01)	0.74 (0.009)
	2nd visit	0.71 (0.01)	0.78 (0.01)
BOP score[a,b]	Baseline	0.25 (0.01)	0.26 (0.01)
	2nd visit	0.29 (0.01)	0.40 (0.01)

[a] Score was the sum of all measurements divided by the number of measurements.
[b] BOP observed until 15 seconds after removal of probe from the sulcus, scored as present (1) or absent (0).

- SRP group: Significant increase from baseline in PD and the BOP score at the 2nd visit ($P < 0.05$); no significant change in CAL or PI
- Control group: Significant increase from baseline in PD, CAL, and the BOP score at the 2nd visit ($P < 0.05$); no significant change in PI
- Significant difference between study groups in PD, CAL, and BOP score at the 2nd visit ($P < 0.05$); no significant difference between groups in PI

- Periodontal conditions worsened in pregnant patients in both the treated and untreated study groups, though this change was not always statistically significant.
- Periodontitis worsened to a greater extent in the group that did not receive SRP.
- Progression of periodontitis may be expected as pregnancy develops and may be minimized with appropriate periodontal care during pregnancy.

Sexton, 2011[23]

- Periodontal outcomes, mean value

Outcome		SRP + OHI (n = 35)	OHI (n = 60)
PD ≥ 4 mm, % of sites	Baseline	27.15	26.55
	Week 16	15.98	18.27
	Week 28	14.92	19.30
PD ≥ 5 mm, % of sites	Baseline	16.61	15.33
	Week 16	7.71	9.98
	Week 28	7.48	10.63
CAL ≥ 2 mm, % of sites	Baseline	24.31	30.93
	Week 16	14.82	20.86
	Week 28	15.72	21.91
BOP, % of sites	Baseline	62.99	56.10

- Clinical indicators of periodontitis improved in both study groups, but SRP was associated with greater improvements than OHI alone in patients with periodontal disease.

Table A7: Summary of Findings of Included Studies

Main Study Findings	Author's Conclusions
<table><tr><td></td><td>Week 16</td><td>39.53</td><td>42.04</td></tr><tr><td></td><td>Week 28</td><td>35.96</td><td>43.42</td></tr></table> • Both study groups: Significant improvement from baseline in all periodontal outcome measures at week 16 ($P \leq 0.001$) and week 28 ($P < 0.001$) • Significant difference between groups in the percentage of sites with PD ≥ 4mm ($P \leq 0.04$), PD ≥ 5 mm ($P \leq 0.002$), and BOP ($P \leq 0.005$) at both follow-up visits; no significant difference between groups in the percentage of sites with CAL ≥ 2 mm.	

BOP = bleeding on probing; CAL = clinical attachment level; CI = confidence interval; GI = gingival index; OHI = oral hygiene instructions; OHI-S = Simplified Oral Hygiene Index; PD = probing depth; PESA = periodontal epithelial surface area; PI = plaque index; PISA = periodontal inflammatory surface area; PMPR = professional mechanical plaque removal (does not include root planing); REC = gingival recession; SD = standard deviation; SE = standard error; SRP = scaling and root planing.

[a] No details regarding the duration of treatment or frequency of treatment (when multiple treatment sessions were delivered over the course of the study period) were provided in the publication.

Table A8: Summary of Recommendations in Included Guidelines	
Findings and Recommendations	**Grade/Strength of Recommendation**
Smiley, 2015[25] – American Dental Association	
"For patients with chronic periodontitis, clinicians should consider SRP as the initial treatment." Clinical Recommendation, page 528.	In favor *("Evidence favors providing this intervention. Either there is a high level of certainty of benefits, but the benefits are balanced with the potential harms, or there is a moderate level of certainty of benefits, and the benefits outweigh the potential for harms."* Page 527*)*
Tonetti, 2015[26] – Group 1 of the 11th European Workshop on Periodontology	
1. *"PMPR both supra-gingivally and sub-marginally as deep as necessary to remove all soft and hard deposits is required to allow good self-performed oral hygiene."* Recommendations for oral health care professionals, page S7 2. *"PMPR as the sole treatment modality in inappropriate in patients with periodontitis."* Recommendations for oral health care professionals, page S7	Good practice point (for both recommendations, strength of recommendation not otherwise defined).
Management of Chronic Periodontitis, 2012[27] – Ministry of Health Malaysia, Oral Health Division	
1. *"For debridement of patients with chronic periodontitis, any of the following procedures can be performed: full mouth disinfection, full mouth scaling and root planing, conventional staged debridement."* Non-surgical therapy, recommendation 2. *"Supportive treatment visits should be performed every 3 – 6 months and be tailored to patients' risk factors for periodontal disease progression."* Supportive periodontal therapy, recommendation	1. Grade A *("At least one meta-analysis, systematic review or RCT or evidence rated as good or directly applicable to the target population",* Grades of Recommendation*)* 2. Grade B *("Evidence from well conducted clinical trials, directly applicable to the target population and demonstrating overall consistency of results; or evidence extrapolated from meta-analysis, systematic reviews or RCT",* Grades of Recommendation*)*
Guidelines for the Diagnosis and Treatment of Periodontal Diseases, 2011[28] – HealthPartners Dental Group and Clinics	
1. *"Ultra-sonic instrumentation when combined with hand instrumentation provides improved instrumentation where access is poor (i.e., furcations, deep pockets, posterior teeth)."* Scale and Root Plane – Treatment 2. *"During the acute phase of [necrotizing ulcerative periodontitis] the most effective treatment is the use of the ultrasonic scaler. This not only allows for the removal of gross debris such as calculus but also provides a gingival lavage that helps flush the bacteria from gingival pockets. This treatment generally reduces the acute symptoms sufficiently to allow for effective subgingival scaling and root planing as necessary."* Less Common Periodontal Disorders – Non-plaque Related Gingivitis	Not reported.

PMPR = professional mechanical plaque removal; RCT = randomized controlled trial; SRP = scaling and root planing.

APPENDIX 5: Additional References of Potential Interest

Previous CADTH Reports

Treatment of periodontal disease: guidelines and impact [Internet]. Ottawa (ON): CADTH; 2010 May 11. [cited 2016 Oct 14]. (CADTH Rapid response report: summary of abstracts). Available from: https://www.cadth.ca/sites/default/files/pdf/k0167_treatment_periodontal_disease_htis1-5.pdf

Periodontal regenerative procedures for patients with periodontal disease: a review of clinical effectiveness [Internet]. Ottawa (ON): CADTH; 2010 Mar 5. [cited 2016 Oct 14]. (CADTH Rapid response report: summary with critical appraisal). Available from: https://www.cadth.ca/sites/default/files/pdf/L0157_Periodontal_Regenerative_Procedures_final.pdf

Treatment of periodontal disease in patients with diabetes: a review of clinical and cost-effectiveness [Internet]. Ottawa (ON): CADTH; 2010 Jun 11. [cited 2016 Oct 14]. (CADTH Rapid response report: summary with critical appraisal). Available from: https://www.cadth.ca/sites/default/files/pdf/l0188_periodontal_treatment_diabetes_htis-2.pdf

Systematic Reviews – All Primary Studies Evaluated in the Systematic Reviews Included in this Report

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Guidelines with Unclear Methodology

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